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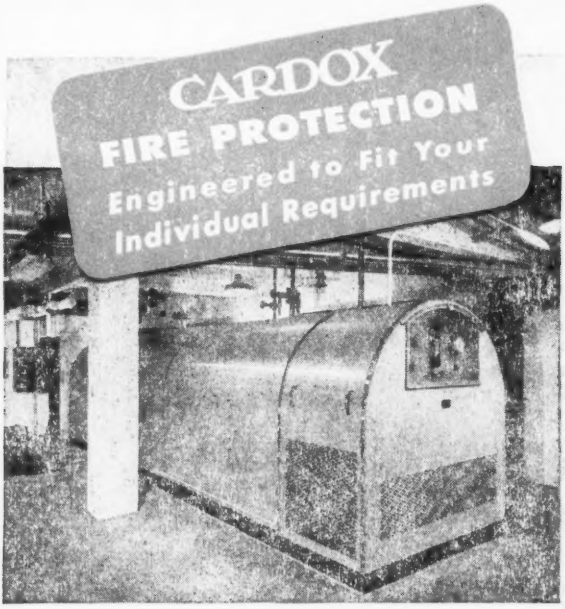

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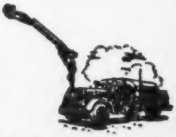

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Press Association

Unprotected vertical openings, inadequate exits, lack of automatic sprinklers and delayed detection were responsible for forty-one deaths in this Christchurch, New Zealand, department store fire on Nov. 18, 1947. Fire started in the basement furniture department, apparently smoldering undetected for some time before it flashed up open stairways. Fire's behavior is the same, all over the world.

The Quarterly

VOL. 41 JANUARY, 1948 NO. 3

Fire Protection Developments in 1947

By Percy Bugbee, General Manager,
National Fire Protection Association

The preliminary estimate of the fire loss in the United States for 1947 is $700,000,000. This compares with the preliminary estimate of loss of 1946 of $561,000,000 and in terms of dollars is the largest annual loss ever recorded, exceeding the previous high figure established in 1926 by a substantial margin. There were 202 fires reported during 1947 with a loss in excess of $250,000. Here again the figure is larger than in any previous year, breaking the record established in 1946 of 187 such large loss fires.

While these figures would seem to indicate that the heavily rising trend of fire losses since the war has continued apace, it should be remembered that we are in an inflationary period and that therefore dollar estimates are distorted and magnified. This is not said to minimize the disgraceful fire record from which our country suffers, but to bring to mind that if the fire loss figures were adjusted to values, the rising loss trend would not appear so startling.

Information as to the number of outbreaks of fire during 1947 is not available at the time of preparation of this statement, but the indications are that there was an increase in the number of fires over the averages of previous years.

Hotel Fire Safety

The past year opened with a wide public interest in the problem of hotel fire safety because of the shocking Winecoff Hotel disaster in Atlanta which occurred late in 1946. After any great fire disaster in any class of occupancy, there is a sharp focusing of attention on precautionary measures to be taken in that occupancy, so throughout the early months of 1947 hotels everywhere were subjected to inspection and many hotel owners took steps to improve the life safety conditions of their properties. The fire marshals of the country, working through the NFPA, prepared a guide to model hotel legislation for states. Many bills

were introduced into state legislatures and many municipal ordinances were prepared but few of them were finally enacted. The public memory is short and the urge to correct conditions which come after every disaster peters out in all too short a time. It is true that some progress has been made but there are still all too many hotels throughout the country that violate the elementary principles of life safety.

Texas City Disaster

By far the greatest fire disaster of the year in the United States occurred on April 16 at Texas City, Texas, when two ships loaded with ammonium nitrate blew up at the dock causing a loss of life of approximately 500, injury to some 3,000 more persons, and property damage estimated in the region of $67,000,000. This was one of the greatest fire disasters of recent times. The large loss of life occurred because of the immediate proximity of persons engaged in the industrial activity of the port and because a considerable body of curious persons had been attracted to the waterfront to witness the fires on the ships. The huge property destruction occurred because of the direct exposure to blast damage of high valued industrial plants in the area.

The other fire experience of 1947 that attracted widespread public attention was the serious outbreak of forest fires in the northeastern section of the country in October due primarily to an abnormal period of dry, warm weather.

Disaster Plans

These two major fire disasters once more focused attention on the desirability of a well arranged, disaster preparedness plan not only for cities but for areas and states. The value of such plans was dramatically demonstrated in Los Angeles on June 22. Following the Texas City disaster, the Los Angeles Fire and Harbor Departments had established a disaster plan for their own marine terminal. An oil tanker blew up at a wharf on June 22 killing ten persons and damaging surrounding property. The disaster plan was clearly effective in holding down deaths and destruction.

Airplane Fires

The year was also marked by an abnormal number of serious airplane crashes and fires. The prevalence of these incidents throughout the year pointed up the major problem that the aircraft industry has in controlling and eliminating such disasters if public confidence in this form of travel is to be maintained.

President's Conference

A highlight of 1947 was the decision of the President of the United States to sponsor and hold a Conference on Fire Prevention in Washington in May. This is the first time in the history of the country that its chief executive has expressed so concretely his personal concern with the serious effects of fire waste upon the safety of the public and the economy of the country. All of the national organizations concerned with fire safety participated wholeheartedly with President Truman and the recommendations of the six Conference committees were widely distributed. Following the Conference, the governors of the 48 states were asked to hold state fire prevention conferences and initiate state programs for fire prevention ac-

tivity. A number of state conferences were held during the fall and additional state conferences are scheduled for the early months of 1948. The mayors of all cities were asked to support a local fire prevention campaign.

Fire Department Progress

Broadly speaking, the fire departments of the country have not yet recovered from the setbacks that they all suffered during the war. There still exists substantial shortages of manpower and equipment. The popularity of shorter hours for firemen with the voters in the cities was very evident during the year and many cities reduced the number of hours without giving much thought to the effect that this action might have on the tax rate. City officials in many places were faced with the immediate problem of substantially increasing the number of men in the department, or if they were unable to do this, with the necessity of closing down fire stations and leaning heavily on the off shift for aid in the event of serious fires. Not all of the cities affected were willing to face the problem realistically and make the necessary adjustments with consequent weakening of the city's fire defenses. It may be that voters favoring shorter hours will not favor increases in pay and the trend to shorter hours for firemen may have an adverse effect on pay schedules.

There was a notable tendency during the year for cities to improve the fire prevention work in fire departments and to establish or strengthen the fire prevention divisions of fire departments. Fire prevention inspection activity by fire departments is much to be desired. Development along these lines was seriously retarded during the war period but is once more gaining strength, and it is to be hoped that there will be continued and widespread further emphasis on fire prevention activity in our municipal fire departments during the coming year.

We could also discern a trend during the year towards better public relations by fire departments so that the public could better understand the problems and activities of the department and give more support. A number of departments delegated public relations activity to a special officer and found this plan to work well.

Legislation

Perhaps because of some of the spectacular fires of the previous year, there was a considerable body of local and even state legislation designed to control the careless smoker, at least in hotels and places of public assembly.

While there has been during 1947 a substantial amount of discussion and activity with respect to the adoption and revision of municipal building codes in the interest of public safety, the building code picture remains confused because of a multiplicity of organizations in the field. A coordination of effort and a consolidation of activity are badly needed as otherwise the individual city and city building inspector is faced with a bewildering array of proposals. Everyone believes in a modern, up-to-date building code, a good housing program and intelligent city planning, but the steps to be taken to bring these about are lost in a maze of conflicting movements and opinions.

New fire protection standards of widespread public interest developed during the year were those on water

spray systems for fire protection, rubbish handling and incinerators, and motorized apparatus for small town and volunteer fire departments.

Fire Prevention Contests

The winners in the 1946 contest for year-round fire prevention activities sponsored by the National Fire Waste Council of the U. S. Chamber of Commerce were in the respective classes of population: Chicago, Cincinnati, Tulsa, Newton, Mass., Mansfield, Ohio and Beatrice, Neb., with Mansfield, Ohio, winning the grand award.

In the NFPA's contest for Fire Prevention Week activity, winners in 1947 were: 1. Oak Ridge, Tenn.; 2. Chicago; 3. New York; 4. Jersey City; 5. Memphis; 6. Louisville; 7. Fort Collins, Colorado; 8. Cincinnati; 9. Atlanta; 10. Anderson, Indiana. Top winners in Canada were Ottawa, Ontario and Arvida, Quebec.

Public Interest

In a period of heavy and rising fire losses, there is fortunately a compensating awakening of public interest in measures of fire protection and fire prevention. Articles about fires and fire prevention in national magazines were never more prevalent than in 1947, and the assistance of newspapers and radio stations in promoting fire prevention campaigns was never greater. All of the educational effort now going on in the field of fire prevention is bound to have its effect in finally bringing the American public to an intelligent attitude of mind and living with respect to at least the common fire hazards.

An international development of importance that should be recorded was the creation during 1947 of the British Fire Offices Committee Fire Protection Association.

The National Fire Protection Association broke all of the previous records in its 52-year history during 1947 measured in terms of members, output of technical and educational publications and demands upon it for information and assistance from all parts of the country and in fact from all parts of the world.

Explosion Venting Meeting and Demonstration

An unusual meeting of the NFPA Committee on Explosion Venting was held in Pittsburgh on October 16 and 17, 1947. This special program, planned by Alan L. Kling of the Factory Mutual Laboratories, Boston, Mass., Chairman of the Committee, and arranged by Irving Hartmann of the Bureau of Mines at Pittsburgh, attracted many representatives of industrial organizations in addition to the regular members of the committee. More than 30 persons were present for the explosion venting demonstrations staged at the Bureau of Mines testing station at Bruceton, and others unable to be present for the demonstrations attended the business session of the committee the following day in the auditorium of the Bureau of Mines station at Pittsburgh. Members of the committee and others who witnessed the tests at Bruceton are shown in the photograph on page 152.

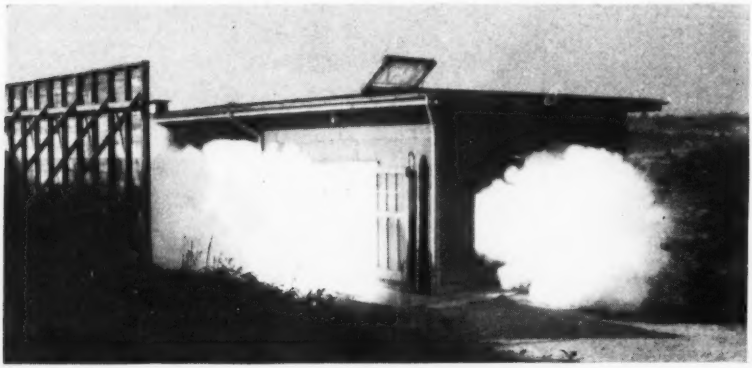
Tour of Bureau of Mines Laboratories

Following a word of welcome by H. P. Greenwald, Superintendent of the Pittsburgh station, greetings by the chairman and the introduction of members and guests at the opening session on Thursday morning, the group visited a number of the Bureau of Mines laboratories in the main building at Pittsburgh to observe methods of testing electrical and other equipment used in mines. Demonstrations of the flammability and explosibility of several dust samples were given by Dr. Hartmann and his associates and Dr. Schrenk explained some of the methods used in gas analyses and tests of respiratory equipment. In the gas laboratory, R. E. Kennedy demonstrated some of the methods used in determining the explosive limits and flammable characteristics of certain gases. In another laboratory, Paul G. Guest of the Bureau staff explained the experiments now being conducted to determine the conditions under which sparks of static electricity may cause ignitions of gases and vapors.

Tests at Bruceton

The trip to Bruceton was made in automobiles, and immediately following the arrival of the party H. C. Howarth, John Nagy, David Buslik, and other members of the Bureau staff explained and demonstrated the equipment and apparatus used in the dust-testing laboratory to determine relative flammability, ignition temperatures, limits of explosive concentration, ease of ignition, maximum pressure, and rate of pressure rise produced by ignitions of dust clouds.

The demonstrations of greatest interest to the committee members were staged in the galleries or explosion chambers. One of the chambers or rooms has a volume of 1 cu. ft.; another a volume of 64 cu. ft.; and the largest one, a 6-foot cubical structure, has a volume of 216 cu. ft. All three are equipped with doors and adjustable openings to permit tests with different ratios of vent areas to volume as well as tests to determine the effectiveness of different types of vent closures. Several tests were made to show the



Bureau of Mines

A view of the 216-cu. ft. gallery of the Bureau of Mines at Bruceton, Pa., during tests in which the pressure produced by ignition of an aluminum dust cloud having a concentration of 0.3 oz. per cu. ft. was released without structural damage through properly proportioned vents in the side walls of the gallery.

conditions under which the pressure produced by explosions of metal dust, plastic powder, or other combustible or readily oxidizable dusts can be released through properly proportioned vents without structural damage. The accompanying photograph, shows the successful venting of an atomized aluminum powder explosion through two wall vents in the 216-cu.ft. gallery.

All members of the party agreed that the large-scale coal-dust explosions outside and inside the Experimental coal mine at Bruceton were the most spectacular demonstrations included in the program. In the photograph, page 151, great volumes of flame and smoke and a considerable amount of debris are shown being blown from the portal or mine opening following ignition of 800 pounds of coal dust in the entry.

Business Sessions of Committee

On Friday morning, members of the committee and guests assembled in the Bureau of Mines auditorium at Pittsburgh to hear the reports of subcommittee chairmen covering their activities since the last meeting. Following an interesting short address by Dr. Bernard Lewis, Chief of the Bureau of Mines Explosives Division, on certain phases of the Bureau's work, Chairman Alan Kling reviewed the activities of the committee and called on several members for reports on special venting problems.

George Hingston, representing the Metal Window Institute, described present conditions and problems confronting the manufacturers of venting sash and called attention to the fact that most venting-sash installations are special jobs and the present trend is toward standardization. Several members discussed the desirability of developing some committee recommendations that will lead to the design of standard forms of venting equipment.

A report of unusual interest to the members was given by Harold Crouch, Eastman Kodak Company, who described methods used to measure pressures and particularly rates of pressure

Bureau of Mines

View of a coal dust explosion in the experimental mine of the Bureau of Mines at Bruceton, Pa. These demonstrations are arranged to show some of the conditions under which disastrous explosions may occur.

rise in closed-chamber explosion tests. A series of charts showing time-pressure curves obtained in tests conducted under different conditions were shown, and emphasis was placed on the necessity of obtaining uniformity in testing methods used by different investigators or arranging for the calibration of different instruments used to permit direct comparison of test data being considered by the committee.

Dr. Irving Hartmann used a number of lantern slides to illustrate his report on some of the important research problems being studied in the Bureau of Mines to determine the effectiveness of different types of vent closures; the conditions under which dust explosions may be safely vented into closed or sealed chambers; and the effects produced when ducts and various duct fittings are attached to vent openings of enclosures in which explosions may occur. Attention was called to the results of both laboratory and large-scale gallery tests on which certain conclusions have been based concerning the relative effectiveness of single and multiple vents, unrestricted and sealed or closed vents, and the relationship between maximum explosion pressure as measured in the laboratory and the required ratio of vent area to volume of an enclosure. Some of the most interesting data presented to the committee covered the tests in which straight ducts, ducts with weather hoods, and ducts with ells or return bends were attached to vents. Some of the results of early work on this subject have been published in Bureau of Mines Report of Investigations 3924, "Effect of Relief Vents on Reduction of Pressures Developed by Dust Explosions," and it is expected that additional information will be ready when the committee prepares for presentation to the Association its report with

recommendations covering the use of vents for the release of explosion pressure.

Before the committee adjourned, there was a round table discussion by the members, ably led by W. M. Jones of the Factory Insurance Association, covering many phases of explosion venting and the additional research that will be necessary before some of the data required by the committee will be available. The chairman emphasized the necessity of making available as soon as possible any information that can be obtained on explosion venting to encourage the development and adoption of this form of protection in industries where dust, vapor, or gas explosions constitute a hazard to life and property.

Bureau of Mines

Witnesses of Tests at Bruceton, Pa.

Front Row, left to right: Hylton R. Brown, U. S. Bureau of Mines, College Park, Md.; S. L. Robinson, Middle Dept. Assn. of Fire Underwriters, Pittsburgh, Pa.; T. E. Tindall, Middle Dept. Assn. of Fire Underwriters, Pittsburgh, Pa.; A. W. Caven, The Travelers Insurance Company, Pittsburgh, Pa.; A. R. Miller Factory Insurance Assn., Chicago, Illinois; F. C. Fluegge, International Harvester Company, Chicago, Ill.; Alan L. Kling, Factory Mutual Laboratories, Boston, Mass.; P. Blommers, Pennsylvania Wire Glass Company, Philadelphia, Pa.; H. J. Hartmann, Aluminum Company of America, Pittsburgh, Pa.; Dr. L. M. Foster, Aluminum Research Laboratories, New Kensington, Pa.; Raynal W. Andrews, Jr., Aluminum Company of America, Pittsburgh, Pa.

Second Row, left to right: John Nagy, U. S. Bureau of Mines, Pittsburgh, Pa.; H. C. Howarth, U. S. Bureau of Mines, Pittsburgh, Pa.; Albert J. Repik, Pittsburgh Coke and Chemical Company, Pittsburgh, Pa.; Maurice P. DeMotte, The Linde Air Products Company, Indianapolis, Indiana; Edward W. Cousins, Factory Mutual Laboratories, Boston, Mass.; Harold W. Crouch, Eastman Kodak Company, Rochester, New York; Paul E. Hubby, Improved Risk Mutual Insurance, New York, N. Y.; W. M. Jones, Factory Insurance Assn., Hartford, Conn.; A. F. Matson, Underwriters' Laboratories, Inc., Chicago, Illinois; E. W. Fowler, National Board of Fire Underwriters, New York, N. Y.; Geo. Hingston, Metal Window Institute, Cheltenham, Pa.; Dr. Irving Hartmann, U. S. Bureau of Mines, Pittsburgh, Pa.

Third Row, left to right: S. C. Colbeck, Pittsburgh Coke and Chemical Company, Pittsburgh, Pa.; J. F. Matejczyk, Pittsburgh Coke and Chemical Company, Pittsburgh, Pa.; David Buslik, U. S. Bureau of Mines, Pittsburgh, Pa.; Stuart D. Miller, Associated Factory Mutual Fire Insurance Co., Pittsburgh, Pa.; Dr. J. W. Zabor, Pittsburgh Coke and Chemical Company, Pittsburgh, Pa.; F. A. Hasse, Corn Products Refining Company, Chicago, Illinois; M. B. Church, Bethlehem Collieries, Pittsburgh, Pa.; Don Trotter, Williams and Company, Pittsburgh, Pa.; D. A. Knapp, Bethlehem Steel Company, Bethlehem, Pennsylvania.

Large Loss Fires of 1947

In 1947, 202 fires caused individual losses in excess of a quarter million dollars. These 202 fires were responsible for a total of $223,300,000 of property losses and contingent expenses, and caused the death of 897 persons. The 202 fires were responsible for about 30% of the total estimated fire loss in the United States and Canada during the past year.

The NFPA original count on the number of these "large loss" fires was 275, but a thorough analysis of the reports showed some glaring examples of inflated loss estimates based on elaborate plans for reconstruction beyond the sound value of the destroyed properties. In this "paring down," 73 fires were eliminated. While the dollar loss figures given in this final tabulation are presented only as an index of the magnitude of destruction, there are very few cases where authenticated information is not available to substantiate the estimates given.

The 1947 record of 202 fires is 15 more than in 1946 (see January 1947 *Quarterly*), and represents an increase of 48% over a five-year period.

The fires analyzed in this article represent only one in five or ten thousand fires which have occurred during the year 1947. They show the worst of the fire experience, but are particularly valuable as examples to point out the various factors essential to fire safety. Many hundreds of thousands of other fires during the year have not reached the large loss class due to limitation in value exposed to destruction in a single fire, good construction, safeguarding of hazards, and effective measures for fire detection and extinguishment.

Occupancy Classification

By broad occupancy classifications, over 50% of the fires occurred in manufacturing and warehousing properties. The breakdown follows, compared with a similar breakdown for 1946.

Table No. 1

Classification	No. of Fires 1947	1946
Manufacturing	64	58
Warehouses	45	44
Mercantile	26	24
Transportation	22	20
Habitational	6	11
Miscellaneous	39	30
Total	202	187

Further breakdowns of these classes for the 1947 fires are given in Table No. 10 pages 160 through 170.

Construction

The 1947 statistics closely paralleled 1946 as regards the types of property involved in large loss fires. Overconfidence in the degree of protection afforded by all the structural types is indicated. Buildings of masonry wood-joisted construction were involved in 50% of the structural fires (see Table No. 5, page 157). In 1946, the figure was 40% with more fires occurring in wood or wood, iron-clad than in 1947. Perhaps most significant about the 1947 picture was the jump of 50% in the number of large fires in so-called "fireproof" buildings. While the two-year total of such cases is only 15, they present important lessons. The May Company fire (Baltimore, Feb. 24), the Plymouth Clothing Company fire (St.

Joseph, Mo., Jan. 15), the Masonic Temple fire (Grand Rapids, May 30) and the Fischer Lime and Cement Co. fire (Memphis, Jan. 21) are examples.

Origins

One of the most significant conclusions from the study of origins of fire is that in the multistory mercantile buildings, 54% of the fires start in the basement (see Table 7, page 158). Since 89% of such fires (see Table 2, page 156) originate during non-operating periods, detection (lacking automatic means) is delayed until the fire breaks through to first or upper stories and is observed by a passerby or upstairs tenants.

The number of fires in one-story buildings lacking basements is also noticeable, especially in the manufacturing and warehousing groups. Most such cases involve large undivided areas where fire spread is rapid, especially with the presence of combustible contents or flammable liquids and gases. Exposure fires showed a marked increase over last year. The warehouse loss at Summit, Ill., January 20, originating in a freight car, is typical of how serious such fires can be. In this connection, it is interesting to note that there were 38 group fires (starred in Table No. 10). Protection against such contingencies, barring explosion damage, can be readily provided by the application of well known fire protection measures.

Operating Status

It will be noted in Table No. 2, page 156 that warehouse and mercantile fires occur predominately while employees are not in the building, while only about 22% of the fires in warehouses occurred during operating periods and only 11% in stores. The key to fire detection depends particularly, therefore, on automatic protection or watchman service in the warehouse and mercantile classes. Our statistics show, however, that in only 20% of the warehouses and 13% of the mercantiles was watchman service provided, while in the manufacturing class, watchmen were available in 64% of the non-operating plants.

Detection

The outsiders and passersby who gave the alarm for almost 39% of the large loss fires in 1947 (see Table No. 3, page 156) could not be blamed for the advanced stages of the blazes which they happened to discover. This percentage is identical with the 1946 experience and continues to be a sad commentary on the lack of a commonsense approach to fire waste reduction. Compare this with the fact that only one fire was reported by automatic alarm service.

Watchmen reported 24 of the 202 fires (less than 12%) and this, plus the fact that in an additional 6% of the cases watchman service was available but not properly administered, indicates the need for better training of these employees, better supervision of their routes, and the hiring of better qualified and more able-bodied personnel for the task.

Transmission of Alarm

Telephones were used to report 113 fires (56% of the total) while only 18% (36 fires) were rung in through a street box. The use of the telephone for fire reporting is increasing along with service efficiency, but it still bears some

cautious analysis. The delays in telephone reporting fall into two classes, psychological and physical. The first is the more important if we are to judge from the record of large loss fires. The known availability of the telephone acts as a deterent in too many cases; a moment's delay to attempt extinguishment with facilities at hand often runs into minutes and when the fire is finally "called in," it is beyond control. Excited persons telephoning a fire alarm still assume considerable clairvoyance on the part of the fire department and fail to accurately present the exact location and circumstances which are so vital to prompt fire department response. The physical limitations of telephone reporting arise from burned wires and blocked access and there were examples of each of these in the large loss fire record of 1947.

Causes

The usual high percentage of unknown causes in large fires makes causal analysis almost meaningless. In 1947, 54% of the fires must be listed in this category while in 1946, 55% were unknown. The known causes are insufficient to draw any worthwhile conclusions. Misuse of electricity was second to heating failures in 1946, but assumed top position in 1947. The division between common and special hazards is not considered significant.

Protection

No automatic protection (of conventional types) was available in 141 of the 166 properties involved in large loss fires where such protection was applicable. This is 84%. Only three of the properties had automatic alarm (detection) service and in two of these unsatisfactory performance was reported. Sixteen structures (ten in manufacturing plants) had automatic sprinkler protection throughout the buildings involved, three had partial sprinkler protection, and three exposed buildings having complete sprinklers were involved in large losses.

The unsatisfactory sprinkler performance was most often a combination of factors and the following are the principal contributing elements:

Insufficient water supply	15
Excessive hazard for system	6
Exposure fire to sprinklered building	6
Explosion damaged system	5
Hose lines depleted water supply	5
Poor distribution of heads	4
Exposure fire to a sprinklered section of a partially sprinklered building	3
Fire department did not connect to system	3
Incomplete protection	3
Antiquated system	2
Obstructed distribution	2
Original fire shielded from sprinkler discharge	2
Roof collapse ruptured piping	2
Water shut-off during fire	2
Control valve too close to permit fire department use	1
Failure of secondary water supply	1
Fire department connected to system, but too late because of advanced stage of fire on arrival	1
Lack of exterior control valves	1
Lack of fire department connection	1
Lack of quick opening device on dry pipe system	1
Sprinkler discharge on foam protected dip tank broke down foam blanket	1
Unknown reason for failure	1
Walls collapsed rupturing piping	1
Water shut-off at start	1

In analyzing the general protection features (private and public), the information in Tables No. 4 and 6 (pages 156 and 157) are helpful keys to a fire prevention campaign. Reference to Table No. 4 reveals that more than half the properties involved had inadequate private protection (lack of automatic protection, fire divisions, etc.) with adequate public protection (fire department services). Inadequate pri-

vate and public protection was noted in about 25% of the total, an unusually large percentage. Table No. 6 specifies what weaknesses were evident in public fire department operations. Manpower and equipment shortages in small communities are both an outgrowth of war-time difficulties and the tendency of property owners to locate their high valued plants in suburban areas for tax reduction purposes regardless of fire protection weaknesses. Note also that the other weaknesses reflect the trend mentioned above; inexperience with large fires, weak water supplies, inadequate hydrants, property located outside city limits, delay in fire department response, access to fire difficult for fire fighting.

Contributing Factors

Perhaps the most significant table of all is No. 8 which lists the contributing factors to the spread of fire. This table is divided into five sections (start, construction features, contents features, life safety, and miscellaneous).

Table No. 2
Operating Status

	Manufacturing	Warehouse	Mercantile	Miscellaneous	Transportation	Habitational	Total
Plant in operation	39	10	3	20	21	3	96
Plant not in operation	25	35	23	17	1	0	101
Occupants sleeping	0	0	0	0	0	3	3
Does not apply	0	0	0	2	0	0	2
Total	64	45	26	39	22	6	202

Table No. 3
Detection

Means of Detection	Manufacturing	Warehouse	Mercantile	Miscellaneous	Transportation	Habitational	Total
Automatic alarm	0	0	0	1*	0	0	1
Occupant (including employee)	31	8	5	16	1	5	66
Explosion	6	1	1	4	0	0	12
Outsider or passerby	15	25	18	9	3	1	71
Policemen (outside)	0	4	1	1	1	0	7
Watchman	12	5	1	5	1	0	24
Unknown or miscellaneous	0	2	0	3	16†	0	21
Total	64	45	26	39	22	6	202

* Alarm located in exposed structure.
† Includes 14 aircraft fires.

Table No. 4
Basic Protection Features

	Manufacturing	Warehouse	Mercantile	Miscellaneous	Transportation	Habitational	Total
Inadequate private protection with adequate public protection	27	30	19	26	3	3	108
Inadequate private and public protection	25	8	4	9	1	3	50
Inadequate public protection and adequate private protection	4	1	0	1	0	0	6
Adequate private and public protection	8	6	3	2	0	0	19
Does not apply	0	0	0	1	18	0	19
Total	64	45	26	39	22	6	202

Table No. 5
Construction

	Manufacturing	Warehouse	Mercantile	Miscellaneous	Transportation	Habitational	Total
Walls							
Fire resistive	3	2	3	1	0	0	9
Noncombustible	6	1	0	3	0	0	10
Masonry	28	19	22	10	0	5	84
Wood	16	16	1	14	0	1	48
Wood-iron clad	11	6	0	0	0	0	17
Not a building	0	0	0	11	22	0	33
Unknown	0	1	0	0	0	0	1
Total	64	45	26	39	22	6	202
Roof Framing							
Fire resistive	0	2	2	0	0	0	4
Noncombustible	15	4	1	5	0	0	25
Mill	3	0	0	0	0	0	3
Wood joist	43	38	23	23	0	6	133
Not a building	0	0	0	11	22	0	33
Unknown	3	1	0	0	0	0	4
Total	64	45	26	39	22	6	202
Roof Covering							
Noncombustible	11	10	1	5	0	1	28
Fire retardant	25	21	20	11	0	3	80
Combustible	21	11	3	9	0	1	45
Not a building	0	0	0	11	22	0	33
Unknown	7	3	2	3	0	1	16
Total	64	45	26	39	22	6	202

Table No. 6
Reasons for Weak Public Fire Department Operations*
(One fire may involve more than one factor)

	Manufacturing	Warehouse	Mercantile	Miscellaneous	Transportation	Habitational	Total
Insufficient manpower	30	10	8	8	6	2	64
Insufficient equipment	29	9	7	8	5	2	60
High valued property in small community	31	9	4	6	5	2	57
Inexperienced with large fires	29	7	7	5	3	2	53
Weak water supply	24	10	2	11	2	2	51
Inadequate hydrants	18	6	1	9	2	2	38
Property outside city limits	5	8	0	10	13	1	37
Delay in response	5	4	2	7	14	2	34
Access to fire difficult for fire fighting	7	10	3	0	10	0	30
No water supply	1	2	0	2	10	0	15
Poor fire fighting	1	4	4	3	0	1	13
Booster tank and tank truck water supply only	0	1	0	0	10	0	11
Fire department not familiar with structure or hazards	1	0	1	0	5	1	8
Necessary to draft from static water source	3	1	0	0	1	2	7
Equipment breakdown or wreck	2	1	0	2	1	0	6
Hydrants too close to fire	2	1	0	2	0	0	5
Water system failure	1	0	0	0	0	0	1

*This tabulation of factors based on information available in reports received with entries made only where evidence was available to indicate weaknesses referenced.

Table No. 7
Place of Origin of Fires

	Manufacturing	Warehouse	Mercantile	Miscellaneous	Transportation	Habitational	Total
One Story Buildings Without Basements							
Exposure	1	0	0	1	0	0	2
First floor	33	15	0	6	0	0	54
Roof	0	2	0	0	0	0	2
Unknown	0	0	0	0	0	0	0
Sub-total	34	17	0	7	0	0	58
One Story Buildings With Basements							
Exposure	0	1	0	1	0	0	2
Basement	1	0	0	3	0	0	4
First floor	0	0	0	1	0	0	1
Roof	0	0	0	2	0	0	2
Unknown	0	1	0	0	0	0	1
Sub-total	1	2	0	7	0	0	10
Multi-Story Buildings							
Exposure	1	0	2	3	0	0	6
Basement	3	4	14	1	0	2	24
First floor	8	7	6	3	0	2	26
Second floor	7	8	1	2	0	0	18
Upper floor	6	3	1	3	0	2	15
Roof	0	0	0	0	0	0	0
Unknown	4	4	2	3	0	0	13
Sub-total	29	26	26	15	0	6	102
Not a Building	0	0	0	10	22	0	32
Grand Total	64	45	26	39	22	6	202

Table No. 8
Contributing Factors to the Spread of Fire
(One fire may involve more than one factor)

	Manufacturing	Warehouse	Mercantile	Miscellaneous	Transportation	Habitational	Total
I. Start							
Delayed detection of fire	25	33	21	19	2	5	105
Discovery by outsider after fire had progressed markedly	14	27	19	10	0	1	71
Not in operation, no watchman or automatic protection	9	22	18	11	0	0	60
Delayed transmittal of alarm	21	10	7	14	2	1	55
Explosion preceded fire or accompanied initial outbreak	13	1	1	6	4	1	26
Employees fight the fire and delay alarm transmission	12	2	3	6	1	0	24
Inadequate alarm or means of alarm transmission	9	0	5	0	1	1	16
Not in operation and watchman failure to transmit alarm promptly or properly	6	3	2	4	0	0	15

Table No. 8 — Continued

	Manufacturing	Warehouse	Mercantile	Miscellaneous	Transportation	Habitational	Total
II. Construction Features							
Inferior construction	42	32	15	20	0	3	112
Lack of fire divisions	42	25	7	7	0	3	84
Lack exposure clearance	27	18	12	18	4	3	82
Unprotected vertical openings	20	19	20	15	0	5	79
Excessive area	32	24	4	13	0	1	74
Lack exposure protection	21	16	14	17	3	2	73
Unprotected horizontal openings	21	6	13	5	1	1	47
Spread through concealed wall or ceiling spaces lacking fire stops	3	4	10	6	1	4	28
Lack of adequate parapet on firewall	3	3	3	1	0	0	10
Highly combustible wallboard	7	3	0	0	0	0	10
Roof collapse	4	3	0	3	0	0	10
Spread over combustible roofs	7	0	0	0	0	0	7
Oily or greasy deposits on structural members	3	2	0	1	0	0	6
Lack of window protection	3	1	1	0	0	0	5
Spread thru open attic	0	0	1	3	1	0	5
Spread thru undivided basement	0	0	3	0	1	0	4
Spread thru open windows	1	0	0	0	1	2	4
Spread thru vents or ducts	0	0	1	1	1	1	4
Open fire doors	1	0	3	0	0	0	4
III. Contents Features							
Quick burning contents	42	27	12	16	4	0	101
Stock concentrated in single fire area	27	32	9	12	0	0	80
Flammable liquids	23	9	2	9	6	0	49
Special hazards not cut-off	26	1	1	4	0	0	32
Stock piling congested	5	10	7	4	0	0	26
Fueled aircraft involved	1	0	0	6	14	0	21
Severe dust conditions	15	2	0	1	0	0	18
Flammable gases	7	1	2	2	1	0	13
Inadequate aisles	3	2	0	2	0	0	7
Inadequate record protection	2	3	1	1	0	0	7
Burrowing fire in stock	2	3	0	0	1	0	6
Fueled automobiles involved	0	1	0	2	2	0	5
IV. Life Safety							
Inadequate exits	2	0	0	1	0	0	3
V. Miscellaneous							
Explosion during fire	17	5	4	6	3	0	35
High wind	8	9	4	10	0	1	32
Heavy smoke	3	5	7	3	1	0	19
Extreme cold	5	2	3	5	0	1	16
Broken windows allowed wind to spread fire	0	6	0	0	0	0	6

Table No. 9
Number of Large Loss Fires by Months

January	29	August	10
February	18	September	13
March	28	October	15
April	11	November	14
May	16	December	17
June	12		
July	19	Total	202

Table No. 10

U. S. AND CANADIAN LARGE LOSS FIRES BY OCCUPANCY CLASSIFICATION

HABITATIONAL

Dormitory

Mar. 13	Cazenovia, N. Y.	Cazenovia Junior College	$317,000
	Three killed in night fire in dormitory. Eighty students in the building safely evacuated.		

Hospital

May 13	near Pittston, Pa.	Ransom County Home and Hospital	250,000
	One elderly patient died of heart attack after successful evacuation of three hundred mental patients.		

Hotels

*Jan. 22	Girardville, Pa.	Cantwell Hotel	350,000
	Group fire; property involved included the hotel, six dwellings, three mercantile buildings and a fire station, all of wood construction.		
Mar. 9	York, Pa.	Colonial Hotel	250,000
	Fire originated in a guest room and did heavy damage to upper stories. Occupants escaped through enclosed stairwell.		
Mar. 16	Clarksdale, Miss.	Alcazar Hotel	500,000
	Multiple occupancy hotel property. Fire spread to a drug store, restaurant, barber shop and offices.		
July 24	Susanville, Calif.	Lassen Hotel	720,000
	Two killed. Multiple occupancy hotel property including a restaurant, cocktail lounge, coffee shop, and three offices.		

Total Loss (Habitational) $2,387,000

MANUFACTURING

Chemical

Mar. 11	Eastview, Ont.	Plastics and Chemicals, Ltd.	$350,000
	Plastics manufacturing including sheeting, flooring and paints.		
*May 21	Eastport, Me.	Mearl Corporation, etc.	300,000
	Rendering (essence of pearl from fish scales) and adjacent properties including a fish cannery, warehouses, and dwellings.		
May 31	Naugatuck, Conn.	United States Rubber Co.	250,000
	Explosion in aniline derivative plant.		
July 24	Cleveland, Ohio	War Assets Administration	350,000
	Inactive; during the war the plant processed nickel and cobalt ore.		
Aug. 12	Nitro, W. Va.	Monsanto Chemical Co.	540,000
	Dodecyl benzol production.		
Oct. 12	Buffalo, N. Y.	Standard Oil of N. Y.	250,000
	One killed; gas holder, solvent tank and tank truck garage destroyed.		
Oct. 17	Redwood City, Calif.	Red Feather Mfg. Co.	275,000
	Stencil and ink manufacturing.		
Oct. 29	St. Stephen, N. B.	Summers Fertilizer Co.	447,000
	Fertilizer mixing-spent tea waste and ammonium nitrate.		
Dec. 15	Newark, N. J.	Celanese Corp. of America	300,000
	Two killed. Plastics; solvent (acetone) recovery building.		

Food Products

Jan. 5	Tiptonville, Tenn.	West Tennessee Soya Mill, Inc.	720,000
	Soy bean mill and cotton seed and soy bean warehouse.		
Jan. 30	Tacoma, Wash.	Centennial Flouring Mills Co.	2,800,000
	Flour mill, grain elevators and warehouses.		

Feb. 10	Alexandria, La.	Red River Cotton Oil Co.	$456,000
	Copra and cotton seed mill and warehouse.		
Mar. 26	Iron River, Wisc.	Bean Sprout Growers Assn.	369,000
	Vegetable canning plant.		
April 18	Sioux City, Iowa	International Flour Milling Co.	500,000
	Flour mill, packing building, 10,000 bushels of wheat, four box cars and power house.		
May 1	Hutchinson, Kans.	Consolidated Flour Mills Co.	280,000
	Flour mill.		
May 18	Vernon, Calif.	Universal Milling Co.	282,000
	Grain mill, elevator, and warehouse.		
June 9	Wrangell, Alaska	Farwest-Wrangell Cannery	360,000
	Fish cannery and adjacent frame buildings.		
July 4	Columbus, Ohio	Gwinn Milling Company	450,000
	Flour mill.		
*July 21	Pendleton, Ore.	Western Milling Company	877,000
	Flour mill and warehouses and exposed properties including a lumber yard, two gasoline filling stations, an apartment block, court house, and dwelling.		
July 24	Stockton, Calif.	Poultry Producers of Central Calif.	400,000
	Poultry grain mill.		
Aug. 22	Council Bluffs, Ia.	Dwarfies Corp., etc.	250,000
	Cereals and powdered egg packaging.		
Aug. 25	Tarpon Springs, Fla.	The Lee Co. of Tampa	425,000
	Fruit canning and canned fruit storage.		
Oct. 19	Salem, Va.	Moore Milling Co.	450,000
	Bran, mash, flour milling.		
Oct. 28	Dania, Fla.	North American Canning Co.	500,000
	Vegetable cannery and warehouse.		
Dec. 3	Dinuba, Calif.	A. M. Taub	300,000
	Grape packing and cold storage.		

Metalworkers

Jan. 2	Loudonville, Ohio	Flxble Co.	1,035,000
	Funeral cars and bus parts (blueprints and records destroyed).		
Jan. 7	Chatham, Ont.	Chatco Steel Products Co.	339,000
	Oil burners, unit heaters, metal press work.		
*Feb. 20	Los Angeles, Calif.	O'Connor Electro-Plating Corp.	3,500,000
	Seventeen killed, 140 hospitalized, 9 buildings totally destroyed, 26 buildings posted unsafe and 81 buildings damaged in immediate area by perchloric acid explosion.		
April 12	near Alexandria, Va.	Fruit Growers Express Co.	300,000
	Railroad car shop, forty refrigerated cars, air brake house and cork and paint warehouse.		
June 6	West Bend, Wis.	Pick Industries	500,000
	Auto brake shoes, fuel pumps and carburetors.		
June 12	Bedford Park, Ill.	Great Lakes Spring Corp.	300,000
	Auto seat springs.		
July 28	White Horse, Yukon	Dept. of National Defense	275,000
	Engineer workshop.		
Sept. 15	Gary, Indiana	Pittsburgh Screw and Bolt Co.	325,000
	Bolt and rivet manufacturing.		
Oct. 25	Los Angeles, Calif.	Weber Showcase Co.	250,000
	Showcase manufacturing.		
Dec. 5	Minneapolis, Minn.	Haertel Products Co.	325,000
	Three employees killed; fur cleaning machinery, fur vaults and refrigeration unit manufacturing.		

Dec. 9	near Patterson, Idaho Tungsten ore separating mill.	Ima Mines	$300,000
Dec. 12	Marion Twp., Ohio Manufacturer of industrial scales, crushers and conveyors for coal mines.	Bonded Scale Co.	250,000

Miscellaneous

April 13	Harrison, N. J. Manufacturing of city gas from coke.	Public Service Electric and Gas Co.	300,000
*April 13	Belle Fouche, S. D. Bentonite plant and exposures.	Baroid Sales Co. (National Lead Co.)	379,000
Dec. 11	Scio, Ohio White pottery.	Scio-Ohio Pottery Co.	1,500,000
Dec. 27	Vernon, Calif. Chinaware.	Vernon Potteries, Ltd.	715,000

Multiple Occupancy

*Mar. 4	Westboro, Mass. Reclaiming sisal and jute (where fire originated), paper box making, shoe manufacturing, wire weaving, leather goods, metal stamping, and tool manufacturing. Exposures involved included clothing manufacturer, a filling station, one dwelling,private garage and three automobiles.	Westboro Industries, Inc.	700,000
*Mar. 5	Boonton, N. J. Originated in restaurant and spread to multiple occupancy industrial building.	Victory Restaurant, etc.	256,000
Dec. 24	Chicago, Ill. Incendiary fire in printing plant spread to involve plastics fabricator and candy company sharing the building.	General Products Co., etc.	250,000

Paper Working

Jan. 15	Oaks, Pa. One killed. Paper converting plant, paper towels, toilet tissues.	Peerless Paper Mills	294,000
Mar. 23	Buck Run, Pa. Paper towels.	General Paper Co., Inc.	282,000
Mar. 31	Chelsea, Mich. Paper twine.	Central Fibre Products Co.	335,000

Textile Workers

Jan. 13	Colonie, N. Y. Shoddy mill.	Colonie Fibre Co.	250,000
Feb. 4	near West Bend, Wis. Woolen mill.	West Bend Woolen Mills Co.	327,000
Feb. 12	Philipsburg, Pa. Sport clothing.	MacLaren Sportswear Corp.	1,500,000
July 15	Los Angeles, Calif. Dyeing and finishing of textiles.	National Dyeing & Finishing Corp.	400,000

Rubber

*Feb. 4	Chicago, Ill. Scrap rubber processing. Spread to adjacent plant manufacturing laundry bleaches.	Dell Tire Corp.	338,000

Woodworkers

Jan. 2	Oxford, Pa. Hardwood furniture, no upholstering.	Oxford Furniture Co.	400,000

Jan. 11	Flagstaff, Ariz. Sawmill.	Southwest Lumber Mills	$475,000
Jan. 24	Reading, Mich. Chairs and card tables (wood and metal).	Acme Chair Company	250,000
April 3	Hughesville, Pa. Furniture (desks and tables).	Mellen Manufacturing Co.	250,000
*April 11	Los Angeles, Calif. Furniture covering, storing and shipping. Also involved adjacent Baron Bag Co. property.	National Furniture Co.	400,000
June 26	near Bainbridge, Ga. Crate and basket factory.	Elberta Crate and Box Co.	395,000
July 11	Syracuse, Ind. One killed. Auto house trailers (wood), some metalworking.	Liberty Coach Co.	800,000
July 17	Austin, Texas Prefabricated houses (wood).	Capital Prefabricators, Inc.	827,000
July 31	Texarkana, Texas Flooring plant, hardwood mill, finished lumber warehouse, dry kilns, box cars (loaded), lumber yard.	E. A. Stewart Lumber Co.	292,000
Oct. 25	Birmingham, Ala. Hardwood flooring, boxes and crates.	Hightower Box and Tank Company, Inc.	255,000
Oct. 25	Cleveland, Ohio Two killed. Wood shingle impregnation, stain compounding, auto seat manufacturing (hair padding, burlap, imitation leather).	Perma Products Co.	387,000
Dec. 4	Strong, Maine Tooth picks, clothes pins, flat wood products.	Forster Manufacturing Co., Inc.	1,160,000
		Total Loss (Manufacturing)	$33,897,000

MERCANTILE

Multiple Occupancy

Jan. 5	San Francisco, Calif. Fire originated in either printing shop or basement area of seed store; other property involved included a hat store, shoe store, stationery store, liquor store, marine equipment store, restaurant, pawn shop, barber shop and offices.	Hansford Building	$455,000
Feb. 19	Columbia, Pa. Fire originated in a clock repair shop; other property involved included town offices, civic auditorium, police station, jail, state liquor store and pool parlor.	Town Hall	307,000
Feb. 25	Covington, Tenn. Fire originated in a retail dry goods store; other property involved included plumbing shop, shoe repair shop, barber shop, beauty parlor and offices.	Covington Supply Company	250,000
Mar. 2	Chicago, Ill. Four killed. Gas explosion occurred in a multiple occupancy building housing a restaurant. The blast caused heavy explosion (no fire) damage in many adjacent mercantile and office buildings.	Pappas' Restaurant	1,750,000
Mar. 2	Wilkes Barre, Pa. One fireman died of heart attack. Fire originated in a department store; other property suffering fire damage included drug, clothing, music and jewelry stores; a beauty shop, photographic studio, art school and a confectionary. Smoke damage to department, shoe, dry good, and 5 and 10 cent stores.	Neisner Brothers, etc.	833,000
Nov. 3	Salem, Oregon Fire originated in basement of drug store and involved a large number of offices.	Guardian Building	500,000
Nov. 10	Omaha, Nebr. Fire originated in basement of clothing and furniture store and involved liquor store, restaurant, beauty shop, dress making shop, photographic studio, printing shop, and numerous offices.	Leflang Building	418,000

Nov. 28	Louisville, Ky.	Boston Building	$332,000
	Fire originated in basement of children's store and involved shoe, candy, and beauty shops, photographic studio and offices. Serious water and smoke damage to adjacent department store.		
Nov. 29	Coatesville, Pa.	Grand Hotel Building, etc.	250,000
	Fire originated in basement of department store and involved a 5 and 10 cent store, restaurant, shoe store, hotel, apartments and offices.		

Group Fires

*Jan. 9	Granite City, Ill.	Moskin Clothing Store	280,000
	Fire originated in a clothing store; other property involved included a variety store, appliance store, drug store, shoe repair shop, sandwich shop, tavern, optometrist, and a hotel.		
*Feb. 15	Fort Wayne, Ind.	Standard Rug and Linoleum Co., etc.	286,000
	Fire spread to a furniture store and china shop with smoke and water damage to a drug store and clothing store.		
*April 9	Woodward, Okla (and surrounding communities)	Multiple Properties	250,000
	Tornado destroyed many buildings with resultant fires. Loss is that assigned to fire damage only.		
*June 22	Thetford Mines, Que.	Multiple Owners	305,000
	Fire of unknown origin involved eight buildings housing a furniture store, hardware store, shoe store, clothing store, tailor shop, barber shop, beauty parlor, radio shop, plumber shop, a library, six offices and eight apartments.		
*Aug. 20	Lexington, Neb.	Rosenberg Co.	340,000
	Incendiary fires in a hardware store and lumber yard (adjoining) spread throughout both properties (aided by explosions of bottled gas) and involved another hardware store, drug store, cigar store and a few smaller mercantiles.		
*Nov. 13	Providence, R. I.	Sullivan Steak House, etc.	400,000
	Fire originated in restaurant kitchen and spread to involve a bowling alley and liquor store in the same building and a supermarket in an adjacent building.		
*Dec. 19	Austin, Minn.	Montgomery Ward, etc.	307,000
	Fire originated in the department store and spread to an adjoining building housing a drug store and dry cleaning plant.		
*Dec. 20	Elkton, Md.	Janis Shoe Store, etc.	250,000
	Fire originated in basement of shoe store and spread throughout that structure and two other exposed buildings. Outstanding mercantiles involved included the shoe store, a grocery store, department store and auto supply store. A theatre and hotel were also damaged.		
*Dec. 24	Cornwall, Ont.	McIntyre and Campbells, etc.	750,000
	Fire originated in multiple occupancy mercantile basement. Property destroyed included hardware, food, clothing, jewelry and stationery stores, plus offices, apartments and other tenants.		

Department Stores

Feb. 24	Baltimore, Md.	The May Company	3,000,000
	A series of incendiary fires discovered within a few minutes of each other. Sprinklers controlled the first two fires but were shut off in the interval and the third fire did extensive damage.		
June 24	Perth Amboy, N. J.	Schindel Department Store	250,000
	Total loss to department store with smoke damage to a furniture store and grocery in adjoining building.		
July 30	Fond du Lac, Wis.	Hills Brothers	358,000
	Total loss to department store and smoke damage to a dress shop, drug store and 5 and 10 cent store in adjoining building.		
Nov. 29	Tulsa, Okla.	Vandever Dry Goods Co.	450,000
	Heavy smoke and water damage to contents with fire confined to one floor.		

Clothing Store

Jan. 15	St. Joseph, Mo.	Plymouth Clothing Co.	$546,000
	Heavy interior damage in a fire resistive building; considerable use of light wallboard for interior decoration and unprotected vertical openings.		

Drug Store

Mar. 6	Memphis, Tenn.	Walgreen Company	268,000
	Total loss to building and contents; upper floors vacant.		

5 and 10 Cent Store

Mar. 24	Hamilton, Ont.	F. W. Woolworth Company	279,000
	Total loss to building and contents.		

Furniture Store

June 22	Rahway, N. J.	Koos Brothers	500,000
	A poorly constructed furniture display store with many light frame additions.		
		Total Loss (Mercantile)	$13,914,000

MISCELLANEOUS

Aircraft Hangars

Jan. 10	Goose Bay, Labrador	U. S. Air Force	$1,613,000
	Two C-54 aircraft, maintenance equipment and facilities.		
June 10	near Honolulu, Hawaii	Territory of Hawaii	2,000,000
	One Navy C-54 and one DC-3, maintenance equipment and facilities destroyed.		
June 12	near Edmonton, Alberta	Royal Canadian Air Force	700,000
	Two military aircraft, maintenance equipment and facilities destroyed.		
*July 23	near St. Joseph, Mo.	St. Joseph Aviation Sales Co.	820,000
	Two DC-4's in process of reconversion destroyed as well as repair and maintenance equipment and exposed warehouses.		
Aug. 6	near Miami, Fla.	Dade County Port Authority	1,000,000
	Eleven aircraft and large hangar destroyed.		

Churches

Jan. 14	Buffalo, N. Y.	St. Mary of Sorrows	391,000
Feb. 10	Georgetown, Ky.	First Christian Church	280,000
Mar. 17	Rock Island, Ill.	Broadway Presbyterian Church	260,000
May 10	New Brunswick, N. J.	First Presbyterian Church	491,000
Nov. 25	Ogdensburg, N. Y.	St. Mary's Cathedral	750,000

Garages

Jan. 21	Lexington, Ky.	Cook Chevrolet Company	250,000
	Garage, repair facilities and thirty automobiles.		
Aug. 6	Wichita, Kan.	Price Auto Service Co.	315,000
	Garage, repair facilities and display room. Sixty automobiles destroyed.		

Lumber Yards, Coal Yards, Stone Quarries, etc. — Open Storage

Mar. 30	near Mahonoy City, Pa.	Lehigh Valley Coal Co.	400,000
	Coal breaker.		
May 20	Mud Fork, W. Va.	Island Creek Coal Co.	300,000
	Coal tipple.		
May 24	Oshkosh, Wis.	Foster, Lothman Lumber Co.	312,000
	Three million board feet of sash and door dressed lumber.		

*June 18	near Auburn, Calif. Two lumber yards.	Empire Mill Works and Cal-Ida Lumber Co.	$347,000
July 26	Krause Station, Ill. Stone crushing, screening and pulverizing	Columbia Quarry Co.	360,000
*Aug. 5	near Fort Worth, Texas Three hundred surplus BT-13 airplanes in open storage and hangar.	Hicks Field	300,000
*Sept. 14	Redding, Calif. Ten million board feet of lumber, two dwellings and a slaughter house.	Shasta Box Co.	860,000
Oct. 20	near New Philadelphia, Ohio Coal tipple, washer and conveyor.	Midvale Coal Co.	300,000
*Nov. 6	Anton, Texas Three thousand five hundred cotton bales in open storage yard destroyed, wagons, trucks, and exposure damage to warehouse.	Anton Bonded Cotton Yard	555,000

Marine Basins

Mar. 3	Miami Beach, Fla. Fifty-three boats and storage sheds.	Miami Beach Marine Basin	390,000
July 31	Latana, Fla. Forty boats and sheds.	Lake Worth Marine Ways	500,000

Other Properties

Mar. 9	Blackwell, Okla. Three killed. Natural gas booster plant explosion.	Cities Service Gas Co.	1,000,000
Mar. 25	Centralia, Ill. One hundred eleven killed. Loss includes workmen's compensation.	Centralia Coal Company	500,000
April 20	Clear Lake, Iowa Dance hall.	Surf Ballroom	295,000
May 30	Grand Rapids, Mich.	Masonic Temple	400,000
*July 20	Essondale, B. C. Hay, dairy and horse barns; farm sheds and silos; farm machinery and equipment.	Colony Farm (Provincial Mental Hosp.)	350,000
*July 21	Minot, N. D. Four killed. Bulk gasoline station; fire spread to a second bulk station, two creameries, a grain elevator, a grain warehouse and two mercantile stores.	Westland Oil Co.	418,000
*Sept. 5	near Highmore, S. D. Prairie fire, stock hay, uncut grass, fence posts; cattle and horses killed.	Various owners	2,165,000
*Oct. 16–25	Maine Forest Areas Two hundred fifty thousand acres were burned, over 1,200 homes destroyed and 16 persons killed in nine major forest fires.	Various owners	30,000,000
Nov. 30	near Marion, Mich. One killed. Gas compressor station, failure of gas main.	Michigan Gas Storage Co.	250,000

Office Buildings

Jan. 29	Rosemount, Minn. Administration building to a war plant.	U. S. Government	250,000
Mar. 31	Chicago, Ill. Bank.	Central National Bank	250,000

Piers

Jan. 8	Weehawken, N. J. General merchandise pier.	New York Central R.R.	6,000,000
Sept. 28	New York, N. Y. General merchandise pier.	City of New York (Grace Line)	3,050,000
Oct. 23	Portland, Me. General merchandise pier with extensive sheds.	Maine State Pier	500,000

Schools

Jan. 12	Syracuse, N. Y. Gymnasium.	Syracuse University	$914,000
July 15	Marion, Ala. Administration offices, chapel, laboratory, classrooms and a few dormitory accommodations.	Judson College, Inc.	500,000
		Total Loss (Miscellaneous)	$60,336,000

TRANSPORTATION

Aircraft

Jan. 6	Chicago, Ill. Aircraft (DC-4) making routine landing struck marker house and burst into flames. Forty-one escaped uninjured.	Northwest Airlines	$400,000
Jan. 20	Oakland, Calif. Aircraft (DC-4) making ground controlled approach landing in heavy fog struck a rock dike and caught fire. Twenty escaped, three with major burns. One fatality resulted.	U. S. Navy	400,000
Jan. 27	near Albuquerque, N. M. Fire at impact caused destruction of a B-29 aircraft. Eleven of twelve occupants were killed.	U. S. Air Forces	750,000
Feb. 28	near Naknek, Alaska Fire in flight resulted in total loss of B-29 aircraft. Fourteen occupants parachuted to safety.	U. S. Air Forces	750,000
May 11	near Cape May, N. J. Practice emergency maneuvers in a Constellation type aircraft not properly performed. Aircraft struck water and burst into flames killing four occupants.	Trans World Airlines	900,000
May 20	near Merkel, Texas Nineteen parachuted to safety following fire in flight originating in one power plant of a B-29.	U. S. Air Forces	750,000
May 22	near Dayton, Ohio A C-97 on a test flight crashed into a pasture and exploded at impact. Five of crew of seven were killed.	U. S. Air Forces	750,000
May 29	New York, N. Y. A DC-4 crashed during take-off and burst into flames. Forty-three were killed, all deaths believed attributed to fire.	United Air Lines	400,000
Sept. 15	near Aberdeen, Md. A B-17 caught fire in flight and fell into Chesapeake Bay. One of the crew of ten parachuted to safety.	U. S. Air Forces	250,000
Oct. 24	near Bryce Canyon, Utah Fire in flight aboard a DC-6 resulted in fatalities to all 52 occupants and to the destruction of the aircraft. Fire is attributed to ignition of gasoline on heater during fuel transfer operation.	United Air Lines	715,000
Nov. 10	near Oklahoma City, Okla. A B-29 crashed into a storage area of P-47 aircraft and burned. Two were killed and five injured.	U. S. Air Forces	800,000
Nov. 18	near New Castle, Del. A Constellation type aircraft crashed during landing after a training flight and burst into flames. All five occupants were killed.	Trans World Airlines	900,000
*Nov. 30	near Seattle, Wash. Overshooting the landing field, a DC-4 crashed and burned after striking an automobile on the highway. Two were trapped in the plane and burned to death and six others died later in the hospital from burns. A blind passenger in the automobile was also fatally burned in making her escape.	Alaska Airlines	750,000
Dec. 16	near Tucson, Ariz. Twelve of twenty crew members of a B-29 died in a crash fire soon after take-off.	U. S. Air Forces	750,000

Motor Vehicles

*Feb.	6	Washougal, Wash.	McCall Oil Co., etc.	$250,000
		Collision of two tank trucks and total loss of a bridge which they were crossing at the time of the accident.		

Railroad

Feb.	4	Kingsburg, Calif.	Southern Pacific R.R.	250,000
		Four killed. Collision of train and gasoline truck-trailer at grade crossing.		
*Sept.	1	Dugald, Manitoba	Canadian National R.R.	250,000
		Thirty-one killed. Collision of two trains. Serious exposure losses including one grain elevator and oil storage tanks.		

Ships

Mar.	7	New York, N. Y.	*M/V John Ericsson*	500,000
		Ship at pier superstructure fire.		
*April	16–17	Texas City, Texas	*SS Grandcamp* and *SS High Flyer*	67,000,000
		Five hundred killed. Explosion of ammonium nitrate fertilizer in holds of ships at pier. Extensive damage to high valued shore installations.		
*June	22	Los Angeles, Calif.	*SS Markay*	5,000,000
		Eleven killed. Explosion of butane blend gasoline during loading at pier. Damage to exposures.		
Sept.	9	Pittsburgh, Pa.	*SS Island Queen*	500,000
		Twenty-three killed. Explosion of vapors in ship tanks ignited by welding spark while at wharf.		
Sept.	24	near Iroquois, Ont.	*SS Milverton* and *SS Translake*	300,000
		Twelve killed. Collision of tanker and collier while underway in St. Lawrence River.		
			Total Loss (Transportation)	$83,315,000

WAREHOUSES

Builders' Supplies

Jan.	21	Memphis, Tenn.	Fischer Lime and Cement Co.	$280,000
		Cement, mortar mix, lime, fibreboard, rock wool, roofing pitch, asphalt, wood sash, wood trim, asphalt impregnated spun glass, etc.		
Jan.	31	near Havana, Ill.	Illinois Power Co.	500,000
		Electric wire, conduit, control equipment, blueprints, records.		
Nov.	28	New York, N. Y.	New York Plumbers Specialties Co.	300,000
		Two firemen killed by wall collapse. Plumbers' supplies.		

Food

Feb.	3	Montreal, Que.	D. C. Brosseau	250,000
		Groceries.		
Feb.	20	Chico, Calif.	E. T. Reynolds & Sons, etc.	1,270,000
		Prunes and almonds.		
Mar.	16	Weston, Ill.	Weston Grain Co.	270,000
		Soy beans and oats.		
May	10	Spokane, Wash.	Boyd-Conlee Co.	276,000
		Feed, seed, grain, soybean, mash, alfalfa, beet pulp and fertilizer.		
May	18	Alvin, Texas	Southern Warehouse Co.	388,000
		Rice.		
July	2	near St. Martinville, La.	St. Martin Sugars, Inc.	597,000
		Syrup, raw sugar and molasses.		
Aug.	29	New Castle, Pa.	Creasey Wholesale Grocery Co.	375,000
		Sugar, canned goods, matches and paper.		

Sept. 16	Tucson, Ariz. Wholesale dry groceries.	James A. Dick Co., etc.	$296,000
Oct. 1	Atwater, Calif. Packing and storage of fruit and nuts.	Atwater Fruit Exchange, etc.	267,000
Oct. 11	Burlington, Iowa. One killed. Groceries, fruit, beer, canned goods, matches, etc.	Burlington Fruit Company	316,000

Furniture

Oct. 8	Long Island City, N. Y. Wholesale furniture storage.	Van Leigh Furniture Co.	300,000

General Storage

*Feb. 9	near Nashville, Tenn. General storage warehouse outside city limits totally destroyed and fire spread to adjacent scrap leather plant.	Mid-Tenn Company	380,000
Mar. 13	New York, N. Y. Relief clothing, drugs, chemicals, plumbing and heating supplies.	Harris Warehouses, Inc.	500,000
Sept. 11	Atlanta, Ga. Furniture, chemicals, pots and pans, refrigerators and radios.	Peaslee Gaulbert Corp., Inc., etc.	338,000
Sept. 16	Three Rivers, Que. Cotton, newsprint, sugar, coffee, molasses and other commodities.	J. C. Malone Co.	530,000

Hardware, Paints, Lacquers, etc.

Feb. 10	Sedalia, Mo. Paints, lacquers and railroad fuses.	Missouri Pacific R.R.	475,000
April 1	Timmons, Ont. Hardware and auto supplies.	George Taylor Hardware Co.	500,000
Sept. 21	near San Antonio, Texas Paints, grease, electrical supplies.	Russell and Butler Salvage Co.	310,000

Merchandise

Jan. 20	Burlington, Vt. Merchandise, farm machinery and lumber.	J. E. Booth Co.	300,000
Jan. 20	Summit, Ill. Merchandise of the Firestone Tire and Rubber Co. in temporary storage.	Lloyd A. Fry Roofing Co., etc.	427,000

Miscellaneous

Mar. 3	near Vernon, B. C. Military supplies.	Royal Canadian Engineers	400,000
April 10	San Francisco (Treasure Island), Calif. Military supplies.	U. S. Navy	500,000
May 16	near Montgomery, Ala. Medical supplies, drugs and foodstuffs.	War Department and Veterans Adm.	6,000,000
Sept. 18	near Granite City, Ill. Military supplies (baled bagging, office supplies, photographic supplies and drafting equipment).	Granite City Engineer Depot	1,000,000
Dec. 31	Paradise, Pa. Storage and packaging of seed with printing of paper packages.	Lancaster Seed Co.	250,000

Multiple Occupancy

Jan. 2	Albany, N. Y. Tenants in this river front warehouse included a liquor distributor (in which section the fire originated) and a truck terminal.	City of Albany, etc.	500,000

Jan. 23	Providence, R. I. Tenants included a biscuit company, jewelry manufacturer (in whose section the fire originated) and a nail company.	Warehouse Realty Corp., etc.	$250,000
Mar. 9	Danville, Va. Tenants included a tobacco warehouse (principal values), an auto supply store (in which the fire originated), a truck terminal, grocery store and dry goods store.	Virginia Carolina Warehouse Co., etc.	345,000
*Mar. 12	Rockford, Ill. Tenants included a truck terminal, general store, woodworker, garage (where fire originated) and a machinery warehouse.	Knox Trucking Co., etc.	950,000
June 12	Cincinnati, Ohio Tenants included a metal (steel and iron bar) warehouse and two light metalworkers. Fire originated in one of the metalworking companies.	E. T. Ward Sons Co., etc.	250,000
Dec. 2	South Burlington, Vt. Storage of insecticides, brush fibres, generating plants and machinery with some manufacturing operations.	Manufacturing and Tool Corp.	420,000
Dec. 22	Des Moines, Ia. General merchandise, electrical appliances and truck terminal.	Burris-Hatch Movers, etc.	365,000
*Dec. 28	Philadelphia, Pa. Clothing, textile and shoe wholesale houses with one printing company, china importer, electrical supply warehouse and three dwellings. Three buildings involved.	National Sales Company, etc.	500,000

Paper

Aug. 7	New York, N. Y. Newsprint.	Daniels and Kennedy, Inc.	660,000
Nov. 12	Philadelphia, Pa. Baled waste paper, baling presses, sorting rooms, and offices.	Pioneer Paper Stock Co.	500,000

Textile

Mar. 27	near Seattle, Wash. Textiles in storage.	Fort Lawton	734,000
*July 11	Peterborough, Ont. Three killed. Fire originated in farmers' wool warehouse and spread to a grain elevator exposure.	G. Whitaker and Co., etc.	272,000

Tobacco

Jan. 25	Madison, Fla. Explosion during fumigation process with resultant fire.	American Sumatra Tobacco Corp.	520,000
*Feb. 22	Henderson, N. C. Tobacco and farm machinery warehouse and exposed property.	C. J. Fleming Supply Co.	258,000
Mar. 7	Clarksville, Tenn. Tobacco in storage.	J. W. Rudolph and Bro.	364,000

Wood and Wood Products†

Mar. 24	Ojibway, Ontario Plywood boats in storage.	Canadian Steel Corp., Ltd.	416,000
*Aug. 25	Port Alberni, B. C. Storage of plywood in pier warehouse with fire spreading to entire pier, stock on pier and to ship at dock. (*SS Sampep*).	Government Assembly Warehouse	4,585,000

Total Loss (Warehouses) $29,484,000

* Indicates Group Fire (involved more than one building under different ownership).

† See also Miscellaneous Group — Lumber Yards.

Acme

Jan. 2, Loudonville, Ohio. While this plant, manufacturing funeral cars, was in full operation, a fire originating near the paint spray rooms followed a layer of vapors along the floor and involved an entire 21,000 sq. ft. unsprinklered assembly area. Flames entered an adjoining fire resistive office section through an unprotected fire wall opening. Valuable blueprints and engineering records were lost. Dollar losses sustained totalled $1,035,000, although the insurance coverage reached only $444,000.

Norristown Herald

Jan. 15, Oaks, Pa. This paper company plant in the small industrial village of Oaks was 100% vulnerable when a fire, originating in a storeroom, went beyond control of hand extinguishers. Absence of fire division walls, lack of automatic protection, and woefully inadequate public protection resulted in total destruction.

Jan. 30, Tacoma, Wash. A closed sprinkler valve rendered useless the automatic protection afforded this highly vulnerable flour mill with a resulting loss of $2,800,000. Fire fighting was handicapped by the location of the wood structure, a high bluff interfering with land approach. The city fire boat (undergoing repairs) was not available until the fire had been burning for two hours.

Commercial Appeal (Memphis)

Jan. 5, Tiptonville, Tenn. This Soya mill previously doing a $2,000,000 annual business, was doomed within 15 minutes by fire discovered by a watchman at 4:10 A. M. Loss was total as light wood frame construction and highly combustible contents (valued at $530,000) gave the fire such tremendous impetus that the two volunteer fire companies could do little.

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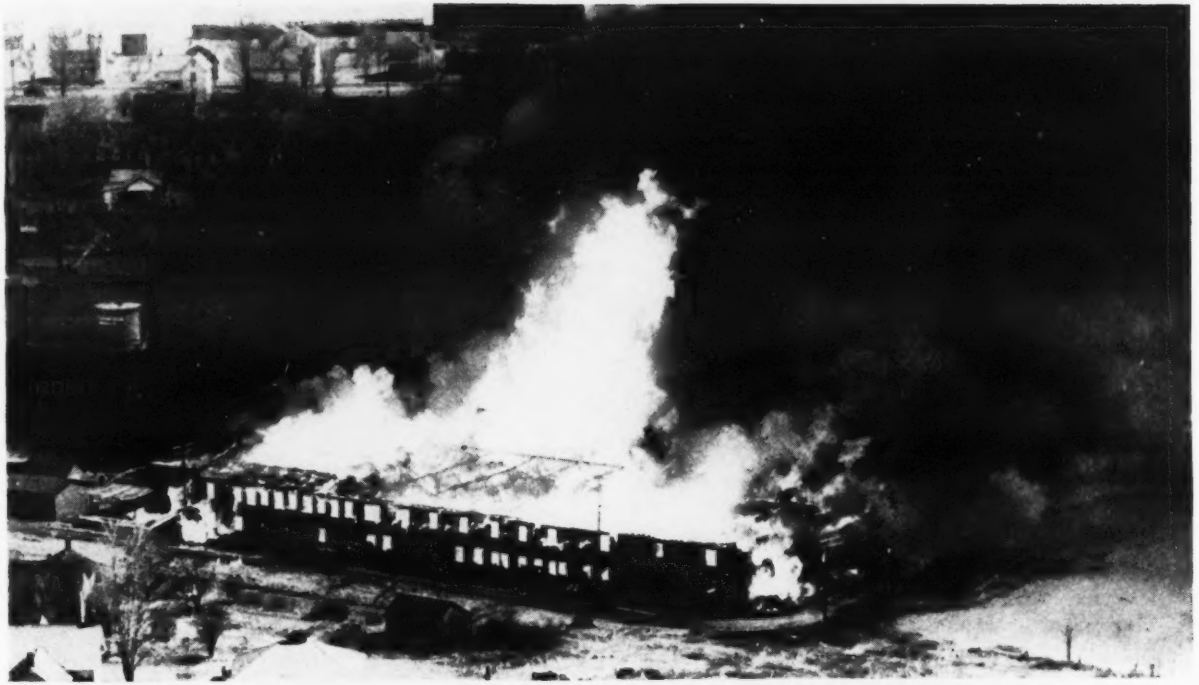

Press Association

Apr. 3, Hughesville, Pa. When automatic sprinkler installations are neither designed to protect the hazards inherent in the industrial process nor properly maintained their failure to control a major fire must be expected. In this plant an ordinary 1905 standard dry pipe system, weakly supplied from a gravity tank and public waterworks, was insufficient to control a flash fire originating in the spraying and finishing area of a furniture manufacturing plant.

Acme

Feb. 20, Los Angeles, Calif. A perchloric acid explosion in an electroplating plant caused the damage illustrated and additional damage to other structures in a twelve city block area. Seventeen persons were killed and property damage and public liability losses are presently estimated at $3,500,000. The process involved the use of an electrolyte consisting of 300 gallons of perchloric acid-acetic anhydride solution. This mixture was placed in a steel, plastic lined vat 6 ft. long, 2½ ft. wide and 3½ ft. deep in which aluminum was suspended in a metal basket during treatment. The acid solution probably became contaminated by organic material and an exothermic reaction took place which, under the influence of evolved heat, resulted in the explosion.

spraying and finishing area of a furniture manufacturing plant.

Photo by L. R. Bridgforth

Apr. 12, near Alexandria, Va. A 550 ft. long frame iron-clad railroad car repair shop of the Fruit Growers Express was easy prey to this fire which originated near a rivet heating machine. Lack of fire division walls, automatic protection, and adequate immediately available public fire protection were obvious deficiencies. Poor construction resulted in spread to adjacent buildings while highly combustible contents (including lumber, cork, felt and paints) provided large amounts of fuel.

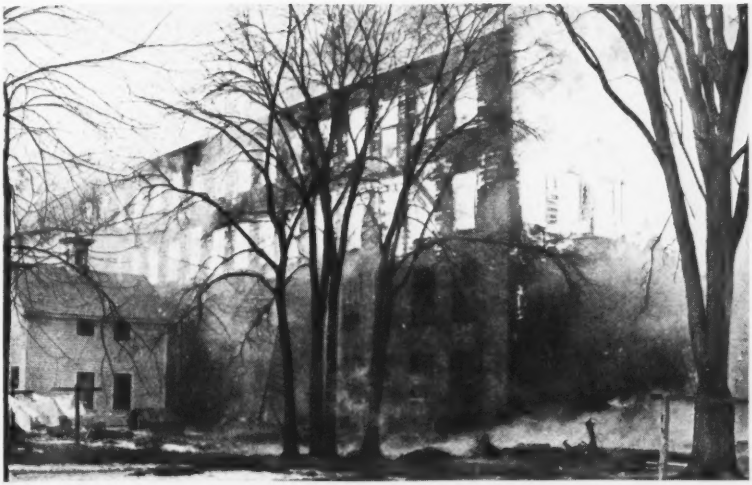

Photo by Ward

Mar. 4, Westboro, Mass. When automatic sprinklers are installed in combustible buildings but lack adequate water supplies, their performance cannot be expected to be satisfactory. This fire swept two four-story sprinklered buildings and other closely grouped buildings as fire fighters from ten surrounding communities aided the local department in attempts to halt the spread. When the first hose line was connected, sprinkler delivery dwindled to mere drops. Tests made in 1944 showed that a flow of 600 gpm. reduced hydrant pressures to 5 lbs.

Frank Cuva

Apr. 13, Harrison, N. J. High peaked roofs present a difficult problem to fire fighters. This blaze originated at a coke gas generator and spread through vertical openings and around steel columns to the 95 ft. high roof and, later, down the coke conveyor at left. The heat was sufficient to cause steel roof supports to buckle and become distorted although the roof did not collapse.

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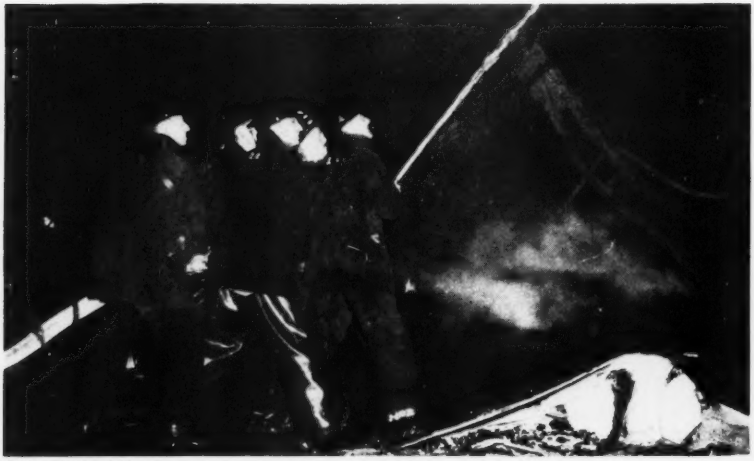
Acme

July 21, Pendleton, Oregon. Fire following a dust explosion of mild intensity on the third floor of this mill situated in the business district of Pendleton resulted in the destruction of eight closely congested mill and warehouse structures and damage to exposed properties. Lack of sprinklers or protection for horizontal and vertical openings hastened the spread of flames through the dust-laden mill.



Redwood City Tribune

Oct. 17, Redwood City, Calif. This pathetic picture of firemen attempting to fight a major fire with inadequate water supplies was repeated many times during the year. In this fire, involving a manufacturer of stencils and inks, the only hydrant was 3,400 ft. distant and could supply only one line. Rural tank trucks (total 3,000 gallons) supplied the only additional water. Loss: total.

Oct. 28, Dania, Florida. Metal clad walls hampered efforts to control flames within this unsprinklered, large area, two-story, wood joisted cannery. Finished canned goods in storage plus machinery accounted for a large percentage of the loss.

Press Association

Dec. 11, Scio, Ohio. A large pottery plant in this small community was extensively damaged by a fire which traveled from the kiln area along conveyors and swept into other plant buildings. Firemen from eleven nearby towns aided the local volunteers. Inadequate water, light construction, and close grouping of the buildings defied efforts at control. The plant was not covered by insurance and the loss is estimated at $1,500,000.

Acme

Mar. 9, Danville, Va. This view shows how total was the damage to an unsprinklered two story multiple occupancy warehouse following a fire which originated in a first floor auto supply store. Tobacco stored on the second floor and lost in the fire was valued at $182,000. The fire was discovered by a policeman at 12:47 A. M.

Acme

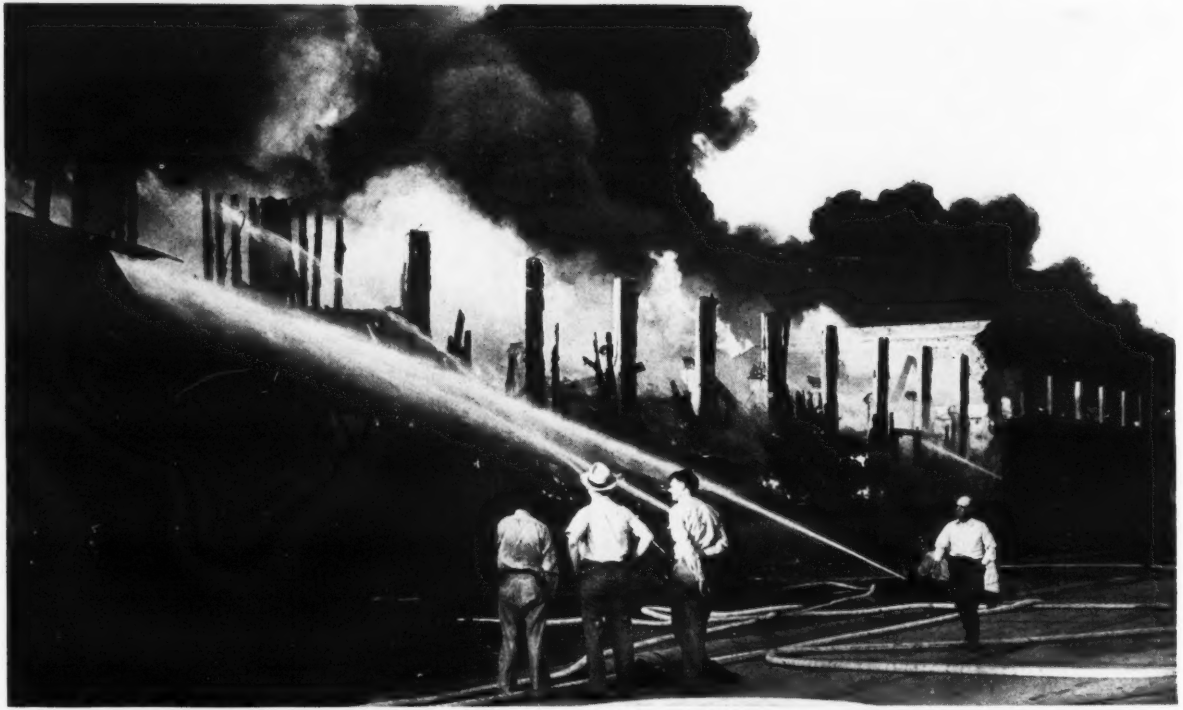
March 13, New York, New York. Originating in the third story of this 5-story building fire followed open stairways to all floors of the warehouse housing relief clothing for Poland, chemicals and pharmaceuticals. Absence of sprinklers, automatic alarm or watchman protection permitted fire to reach serious proportions before discovery.

Press Association

July 11, Peterborough, Ontario. A smoldering bale of farmers' wool burst into flames when opened in the first floor grading section of the unspinklered wool warehouse. Fire raced up ramps and chutes of the heavily loaded structure trapping three employees on upper floors. Thousands of tons of grain were damaged as wind-fanned flames extended to an adjacent feed mill through plain glass windows.

Photograph by Sam Levitz

Sept. 16, Tuscon, Arizona. This unspinklered metalclad building of 40,000 sq. ft. area (without fire division walls) contained $260,000 worth of groceries. Fire originated in the concealed ceiling space and flashed over a heavy accumulation of cotton lint. (The building had previously been used to store cotton.) Fifteen minutes after a traveling private policeman checked the building, fire was discovered by a service station attendant a block away.

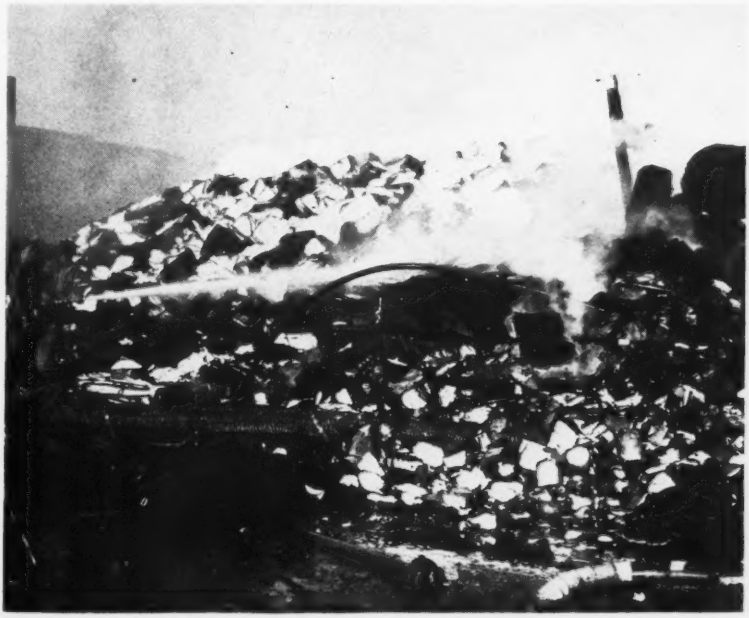


Southern Commercial Photographic Co.

May 16, near Montgomery, Ala. The warehouse, owned by the War Department and tenanted by the Veterans Administration, was not sprinklered and yet contained an estimated $5,500,000 worth of medical supplies, alcohol, and food stuffs. The wood structure was subdivided by fire walls but a combustible loading platform canopy permitted the flames to burn around these barriers

Acme

Apr. 10, 1947, Treasure Island (San Francisco), Calif. This view shows the seven acres of ruins following the fire in the Naval Base warehouse. Three fire walls did not extend through the roof of the unsprinklered wood building and fire doors were alleged to have been tied open at the time of the fire. (See July 1947 Quarterly frontispiece for view of the fire in progress.)



Sept. 18, Near Granite City, Illinois. This view of debris shows, in the foreground, a part of the riser to the sprinkler system installed in the government warehouse at the Granite City Engineer Depot. Highly combustible contents (including burlap bags in bales) caused a flash fire which defied the effort of operating sprinklers to control the blaze. The secondary water supply failed after the primary source was exhausted. The loss is estimated officially in excess of $1,000,000.

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Press Association

Oct. 11, Burlington, Iowa. A fireman was suffocated while taking a hose stream downstairs to a fire in the basement refrigeration room of this grocery warehouse. A passerby discovered the fire at 11:28 P. M. Flames spread to upper floors through pipe openings as dense smoke, barred windows and high piled stock hampered firefighting.

Acme

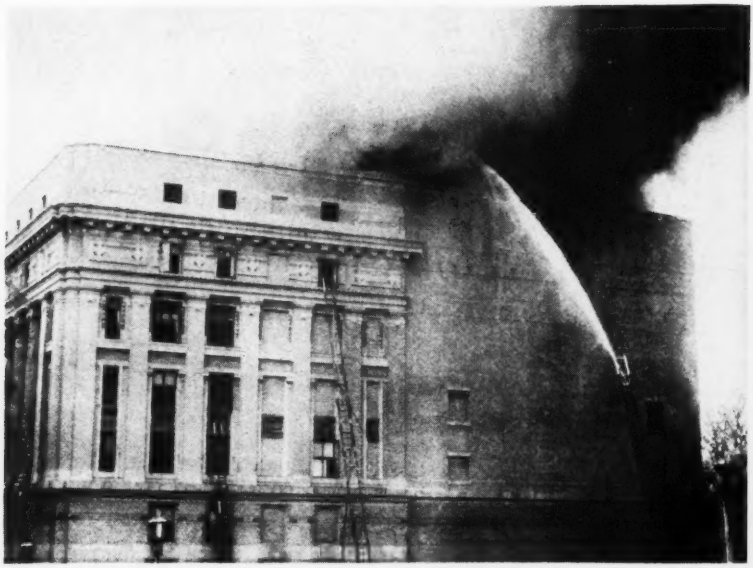
Nov. 28, New York, New York. Old loft buildings present a life hazard to fire fighters as well as being vicious fire and exposure hazards. In this plumbers' supply building, two firemen were killed and two others seriously injured when the roof of the five-story wood-joisted building collapsed. Property damage is estimated at $300,000.

Courtesy Leonard C. Lund

Jan. 29, Rosemount, Minn. This unusually good photograph shows the value of a parapeted and winged fire wall which saved a major portion of the Administration Building of a war plant. The building, constructed of plywood and wall board with wood siding would have been a total loss due to absence of automatic protection if the fire wall had not been provided with openings protected by standard fire doors.

Press Association

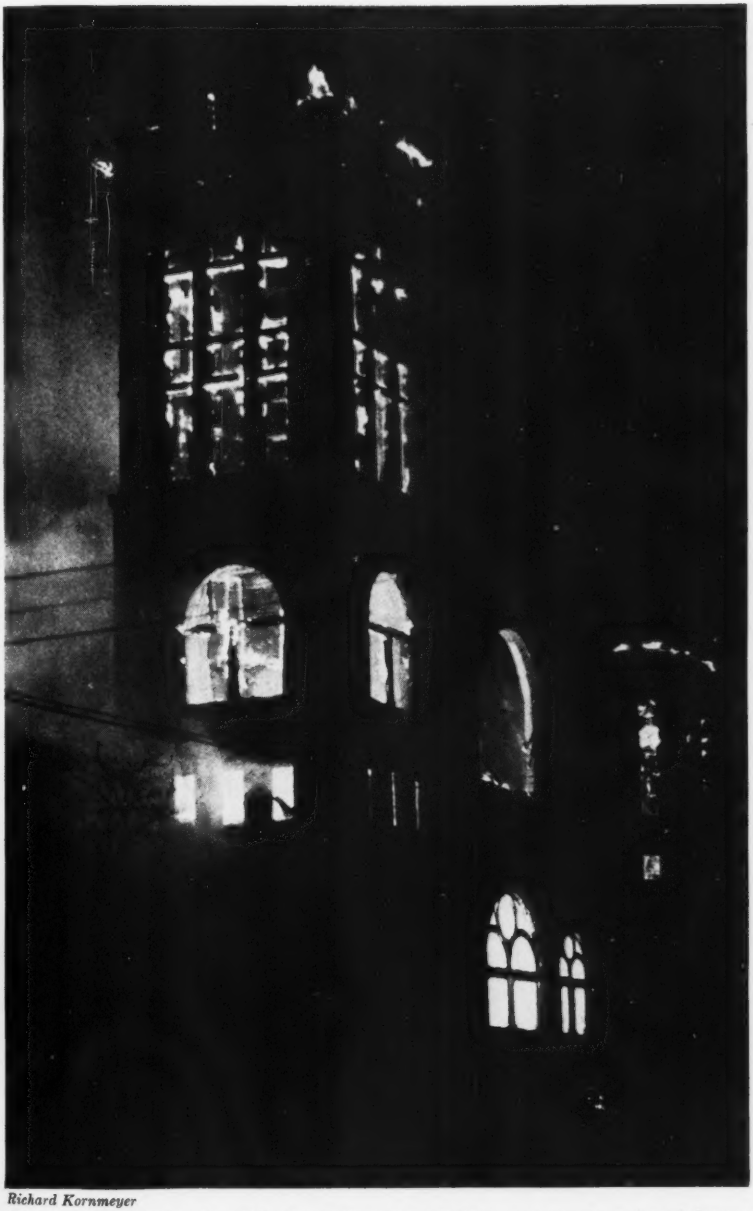
July 21, Minot, N. D. Explosion and fire followed overflow of gasoline from a 15,000 gallon undiked storage tank in the business district. Four persons were killed and two creameries, two bulk storage plants, and a grain elevator group were destroyed.



May 30, Grand Rapids, Mich. Enclosures concealing air conditioning ducts in this partially fire resistive Masonic Lodge allowed flames to travel from the basement to the undivided attic and wood roof before detected by outsiders. The blank wall of the auditorium handicapped fire fighting. Each floor suffered fire damage as flames entered through grating openings. Structural damage is estimated at $380,000 while contents loss is $20,000.

Wichita, Eagle

August 6, Wichita, Kansas. Sixty automobiles were destroyed or damaged by the fire that swept this unsprinklered garage. Note the construction deficiencies; wood floor (which was oil soaked), unprotected steel and cast iron columns (which could have been protected by fire retardant plaster) and the wood roof (obvious by its absence). Unprotected openings (stairs and ramp) and lack of fire divisions in the 42,000 sq. ft. building allowed serious extension of the fire as employees fumbled in attempts to telephone the Fire Department (alarm boxes in the vicinity were not used).



Richard Kornmeyer

Feb. 10, Georgetown, Ky. This church fire originated from an overheated or defective gas furnace and was first detected at 2:00 A.M. by an outsider. The wood-topped steeple crashed into the interior as flames raced through the chimney-like tower. A high valued organ and carillon were lost as well as an old silver communion service.

Acme

June 22, Los Angeles, Calif. This general view of the S. S. Markay fire in Los Angeles harbor shows both sides of the 600 ft. slip involved. Butane-blended gasoline vapors ignited during loading of the tanker were responsible for the explosion and the fuel was thrown on the water to spread the fire over the wide area. Efficient disaster planning prevented more widespread damage.

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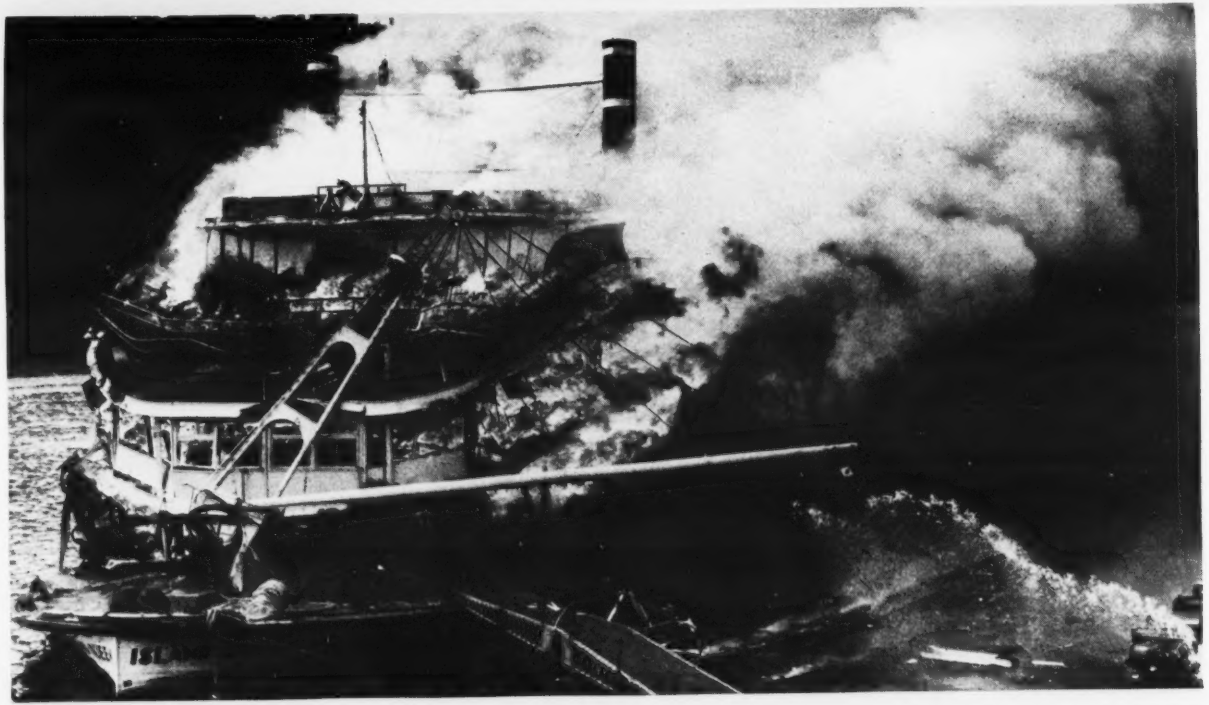
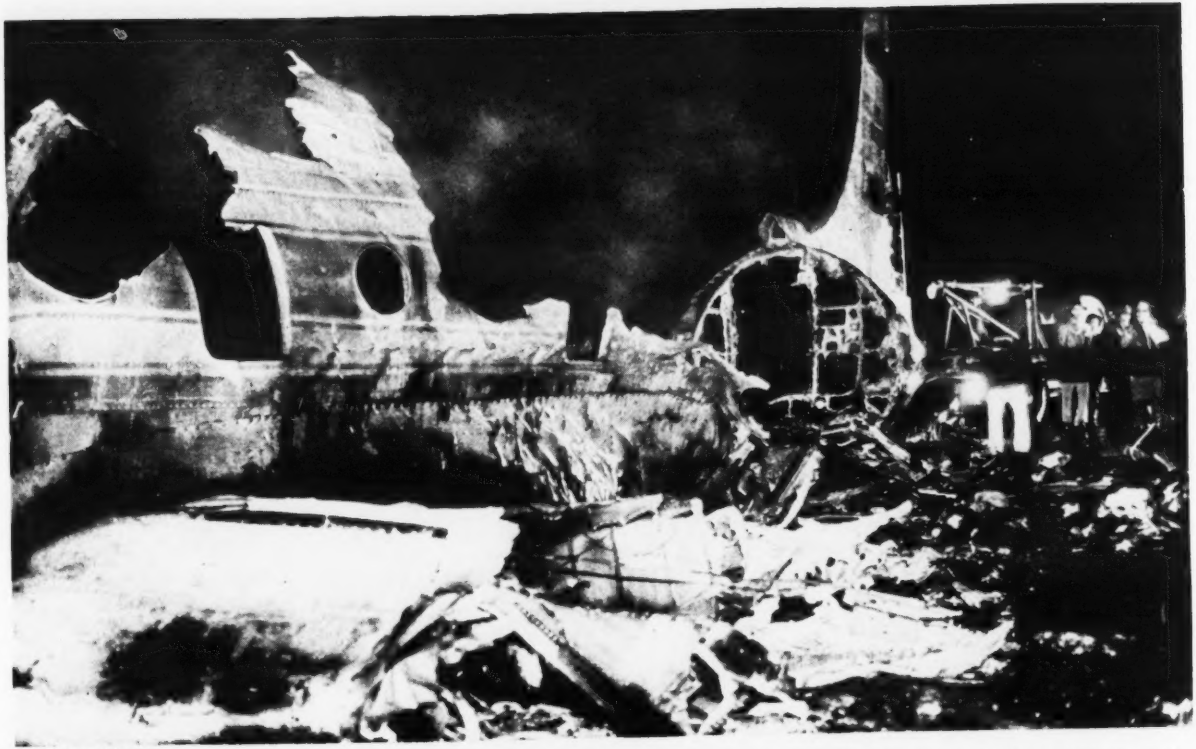


Acme

Sept. 9, Pittsburgh, Pa. Twenty-one of the crew of the "Island Queen" were trapped, drowned or fatally injured when two explosions ripped apart the bow of the river excursion steamer. Flames immediately flashed through the super structure and had complete control of the vessel when apparatus arrived. Vapors in fuel oil tanks are believed to have been ignited by welding operations being conducted on the main deck. The deck constituted the top of the tanks.



Press Association

Nov. 30 near Seattle, Wash. Eight of the 28 occupants of this DC-4 died from burns received following a landing accident at the Seattle-Tacoma Airport. A blind occupant of an automobile struck by the plane as it careened across highway was also fatally burned. 1000 gallons of gasoline was involved and 7700 lbs. of air freight was destroyed.

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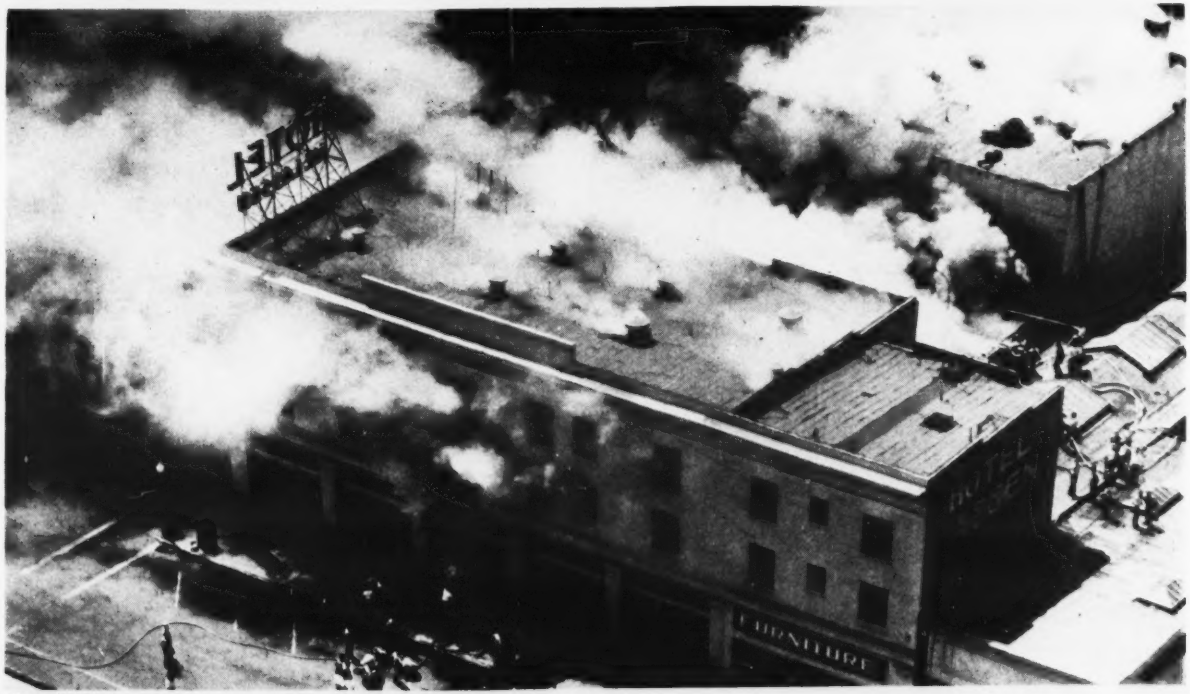


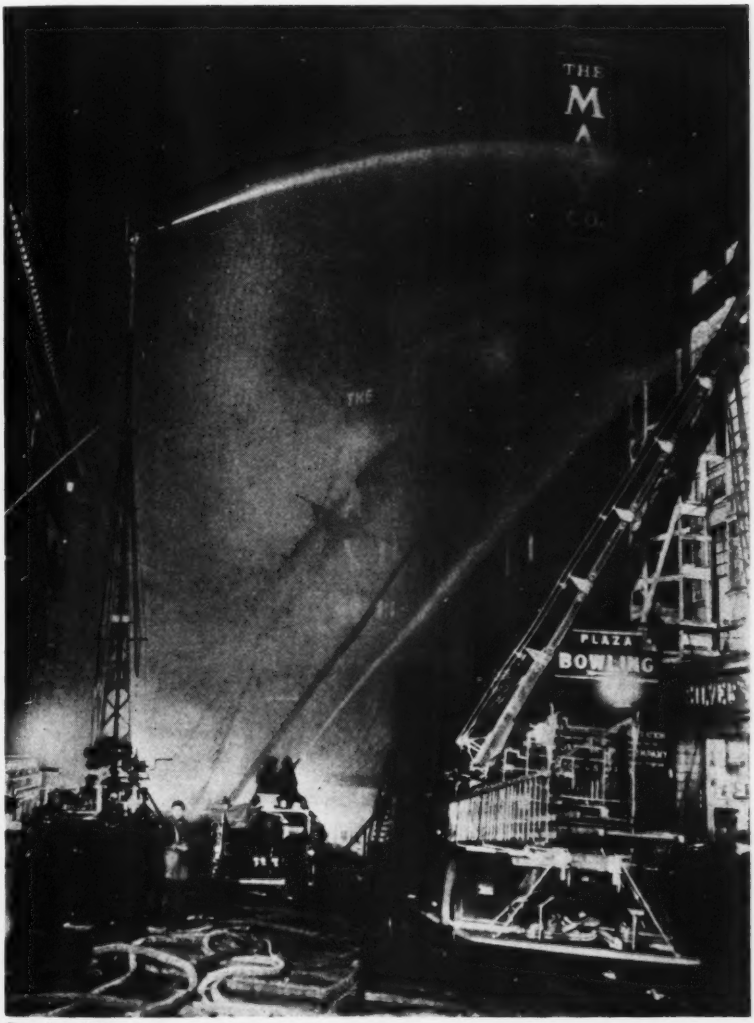
Press Association

July 24, Susanville, Calif. The Lassen hotel was heavily damaged by a fire which trapped two persons in the basement. Heavy smoke permeated the three story building through the ventilator system (note roof vents in photograph) and was so thick in the basement that firemen could not determine or reach the source of the fire. Attempts to control the flames with a deluge pipe through holes in the floor were also unsuccessful. The loss to the building and contents was almost total and reached $720,000.

Jan. 15. St. Joseph, Mo. Combustible trim, fixtures and stock in the unsprinklered fire-resistive store of the Plymouth Clothing Co. accounted for the damage illustrated. Delayed discovery, open stairs and elevator shafts and air conditioning ducts spread the fire to all three floors. Loss, $545,871.

Neuman Studio

Feb. 15, Fort Wayne, Indiana. A wood and plaster board partition in a breach of a fire wall permitted this fire to sweep through two originally separate structures. Stores involved included a rug and linoleum outlet and a furniture and china shop. The fire was discovered by a passerby at 9:02 P.M.



Press Association

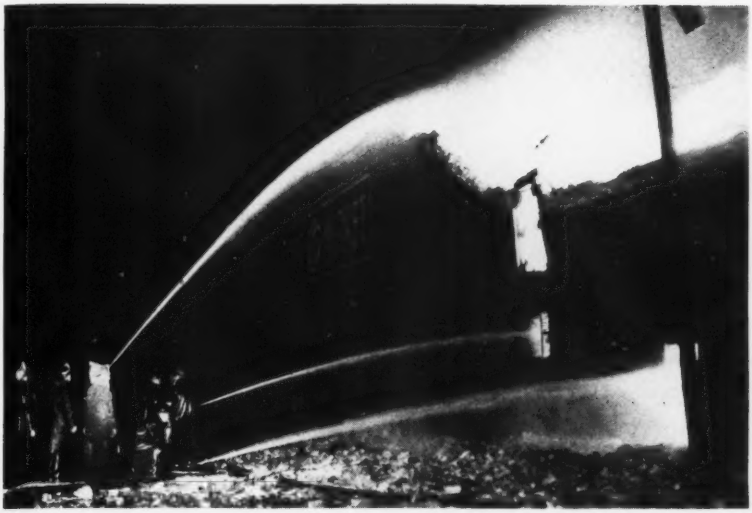
Feb. 24, Baltimore, Md. Unsupervised sprinkler valves were found closed following the last of three outbreaks of fire (all believed incendiary) which occurred within a few minutes of each other. The first two fires were controlled by sprinklers, but the last spread throughout the fifth floor of the main building causing structural damages to the fire-resistive building estimated at $466,000. Furniture and fixtures damages totalled an additional $225,000 while the stock loss reached $979,000. Added to this was an extensive business interruption loss to bring total insurance payments close to $3,000,000. Fortunately the store was closed and vertical openings protected so that there was no loss of life and damage was limited to the one floor.

Mill Adams

Mar. 6, Memphis, Tenn. A basement fire at 3.55 A. M. spread up a frame enclosed elevator shaft to involve the entire, unsprinklered, four story, ordinary brick, wood-joisted building. The Walgreen Drug store on the first floor was the sole tenant but their loss was total and is estimated at $100,000. The structure was valued at $168,000.

Press Association

November 10, Omaha, Nebraska. This fire, like 75.8% of 2,010 store fires recently studied by the NFPA, started during an inoperative period. Lack of automatic protection or watchman service delayed discovery until a passerby noted fire in the building and telephoned the alarm. The loss reached $373,000 with six businesses suffering total losses.

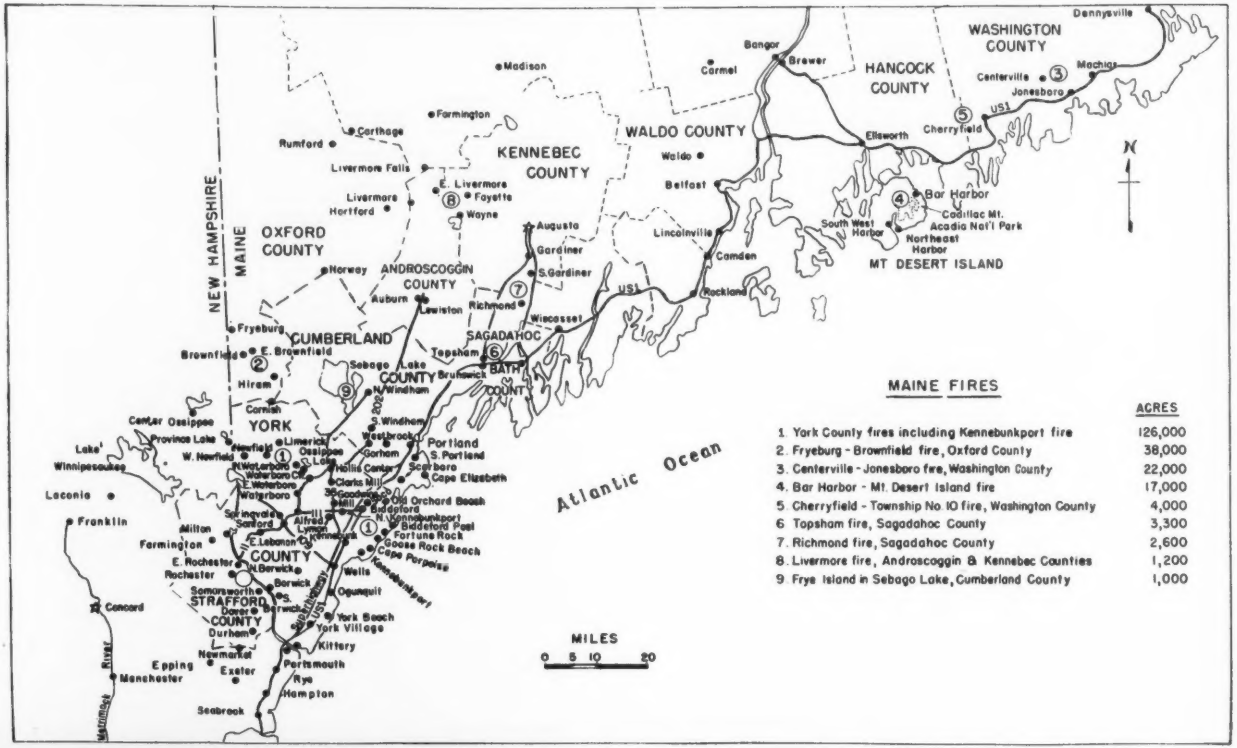


Acme

Nov. 13, Providence, R. I. Evidence of the destruction that can befall a building not properly protected against a severe exposure fire is shown by this picture. Fire raging in an adjacent building housing a restaurant and 42 bowling alleys ignited the combustible roof of the "Super Market", ate down into the storage area and thence to the sales department.

Acme

Dec. 20, Elkton, Md. A fire originating in the basement of a shoe store involved three contingent multiple occupancy mercantile buildings before being brought under control by firefighters from eleven communities. Lack of fire hydrants in the rear of the business buildings forced the use of long hose lines from a river.


NEW HAMPSHIRE
MAINE
OXFORD COUNTY
CUMBERLAND COUNTY
YORK COUNTY
STRAFFORD COUNTY
KENNEBEC COUNTY
ANDROSCOGGIN COUNTY
SAGADAHOC COUNTY
WALDO COUNTY
HANCOCK COUNTY
WASHINGTON COUNTY
MT DESERT ISLAND
Atlantic Ocean
Portland
Lewiston
Auburn
Augusta
Bangor
Brewer
Ellsworth
Cherryfield
Machias
Jonesboro
Centerville
Dennysville
Bar Harbor
Cadillac Mt.
Acadia Nat'l Park
Northeast Harbor
South West Harbor
Rockland
Camden
Lincolnville
Belfast
Waldo
Carmel
Madison
Farmington
Carthage
Rumford
Livermore Falls
Livermore
Hartford
E. Livermore
Fayette
Wayne
Gardiner
S. Gardiner
Richmond
Wiscasset
Topsham
BATH
Brunswick
Norway
Fryeburg
Brownfield
E. Brownfield
Hiram
Cornish
Limerick
Waterboro
Sanford
Alfred
Kennebunk
Kennebunkport
Biddeford
Old Orchard Beach
Saco
Scarboro
Cape Elizabeth
Gorham
Westbrook
S. Windham
N. Windham
Sebago Lake
Frye Island
Clarks Hill
Hollis Center
Gray
New Gloucester
Lisbon
Lewiston
Wells
Ogunquit
York Beach
York Village
Kittery
Portsmouth
Rye
Hampton
Seabrook
Exeter
Epping
Newmarket
Durham
Dover
Somersworth
Rochester
E. Rochester
N. Berwick
Berwick
Milton
Farmington
E. Lebanon
Acton
Shapleigh
Alfred
Lyman
Limington
Cape Porpoise
Goose Rock Beach
Fortune Rock
Old Orchard Beach
Biddeford Pool
Kennebunkport
Laconia
Franklin
Concord
Manchester
Winnipesaukee
Lake
Center Ossipee
Province Lake
W. Newfield
Newfield
E. Waterboro
Waterboro Ctr.
Ossipee
L. Ossipee
Cornish
Hiram
Brownfield
Fryeburg
Norway
Oxford
Auburn
Lewiston
Richmond
Gardiner
Augusta
Wiscasset
Topsham
Brunswick
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Acadia Nat'l Park
Northeast Harbor
South West Harbor
MILES
0 5 10 20
N
MAINE FIRES
ACRES
1. York County fires including Kennebunkport fire 126,000
2. Fryeburg - Brownfield fire, Oxford County 38,000
3. Centerville - Jonesboro fire, Washington County 22,000
4. Bar Harbor - Mt. Desert Island fire 17,000
5. Cherryfield - Township No. 10 fire, Washington County 4,000
6. Topsham fire, Sagadahoc County 3,300
7. Richmond fire, Sagadahoc County 2,600
8. Livermore fire, Androscoggin & Kennebec Counties 1,200
9. Frye Island in Sebago Lake, Cumberland County 1,000

Maine Forest Fires

During October 1947, Maine had nine major burn areas with an estimated acreage of from 1,000 to 100,000 acres each, according to Forest Commissioner Raymond E. Rendall. A total of 230,000 acres were burned in the organized town areas of Maine. Burns within the unorganized wildland areas under control of the State Forest Service were less than 20,000 acres. There are ten million acres of unorganized land and six million acres under town authorities.

Estimated volumes of "saw timber" burned run between 100,000,000 and 150,000,000 feet board measure, in addition to which there are some 50,000 cords of smaller sizes, some of which can be salvaged for pulpwood. Over 1,200 homes were destroyed and some 6,000 persons made homeless. Some sixteen persons lost their lives. Estimated damages run approximately $30,000,000, as a result of these forest fires which developed following a period of more than three weeks without rainfall at a time when autumn leaves were falling.

Practically all fires were brought under control by the use of forest fire-equipment, such as portable power pumps, back tank pumps, and miscellaneous small tools, supplemented by fire department apparatus. This equipment also was supplemented by the use of bulldozers for constructing fire breaks and the use of tank trucks for the hauling of water. As in other New England forest fire areas, extensive use was made of wetting agents to secure better penetration of water and complete the extinguishment of fire lines, eliminating to a large extent the work of patrolling fire lines. Commissioner

Typical view of how fire swept through forest litter such as slash from old cuttings and debris from windfalls.

One of the first pictures taken of the fire in the Kennebunkport-Biddeford region. It shows flames leaping across U. S. Highway 1 at North Kennebunkport on its way to Goose Rock Beach and Cape Porpoise.

Rendall pointed out that the wetting agents added to water supplies produced marked penetration and saturation of oak leaf and pine needle litter, duff, sawdust piles, logs and stumps and stated "on high hazard days with dry conditions, the use of wetting agents is particularly successful in effecting faster and more complete extinguishment of the fire line, and reducing the amount of patrol." Approximately 800 gallons of wetting agents, flown by the Army and Navy from the Quonset Naval Air Station in Rhode Island, were dispatched to all major fire fronts.

With so many major fires occurring almost simultaneously, it is difficult to give a complete report on the development of all of the major fires. State agencies are still at work compiling data as to the vast damage wrought. In Maine, the largest fire areas were in York and Oxford Counties in the southwest corner of the State, just east of the New Hampshire line, and on Mount Desert Island further east, where the city of Bar Harbor was attacked by a forest conflagration and also in Washington County in eastern Maine. There were many other major fires, which, however, were of lesser consequence at least when measured by the amount of improved property and acreage destroyed.

Kennebunkport area — York County

Perhaps the first of the Maine forest fires to gain widespread attention broke out near U. S. Highway 1 at North Kennebunk on October 20. The fire jumped the highway and moved rapidly toward the resort village of Fortune Rock on the Atlantic Coast five or six miles distant. It is reported that there was considerable confusion as fire fighters and volunteers rushed toward the fire and trucks loaded with household goods attempted to move away from the fire area. Trains between Boston and Portland, Maine, were delayed as section gangs fought the fire along the right of way.

The following day, Tuesday, Octo-

Air view of ruins of ten cottages at the Goose Rock Beach resort in the town of Kennebunkport.

Acme

The Goose Rock Beach destroyed by the fire starting near U. S. Highway 1, North Kennebunkport in York County, Maine, on October 20. Some two hundred homes and cottages were destroyed at Goose Rock Beach and Cape Porpcise on October 21.

ber 21, the flames swept down on the resort villages of Goose Rock Beach and Cape Porpoise southwest of Fortune Rock, destroying 200 homes and summer cottages and the 40-room Hotel Belvidere. Also destroyed was the O'Hara Water Color School with many valuable paintings. At this time the fire was burning on an unbroken eight-mile front with spot fires travelling 300 yards or more ahead of the main fire. Roads were heavy with traffic but fire fighters were mobilized from Newington, Rollingsford, and Dover in New Hampshire and from Kittery Navy Yard, Biddeford, Portland (sent two engines), Wells, Eliot, Ogunquit, Kennebunk and Kennebunkport in Maine. The U. S. Coast Guard sent three pumps and tank trucks. Bulldozers were of great value in constructing fire lines. Fourteen homes and some farm buildings were destroyed in the Guinea Road section of Kennebunkport but fire fighters using backfires saved the main portion of that town.

The following day, the relative humidity at Portland was down to 15 percent as contrasted with a normal of 60 at that time of year. The Kennebunk fire was burning toward the Saco River and the congested city of Biddeford. Some 3,000 acres were then burning in this fire. The following day, the Biddeford fire fighters, aided by outside departments, made a stand, and prevented the flames from crossing Route 208 leading to the village of Biddeford Pool. Almost all of the buildings in

Fire fighters use small hose from tank apparatus to save seriously exposed frame home on the road to Biddeford Pool.

Acme

Destruction of large summer home at Cape Porpoise, Maine, on October 21, as flames swept along an unbroken fire front eight miles long.

these various fire areas consisted of frame buildings, many with weather beaten wooden shingle roofs and unpainted wooden shingle siding.

Thursday, October 23, was perhaps the most critical day of the week and the day in which the greatest destruction occurred. A sudden shift in the thirty m.p.h. wind took fire fighters by surprise and flames again swept down upon the village of Fortune Rock which had been saved from destruction on Monday afternoon. This time 150 of the 156 summer cottages were destroyed along with four hotels. Damage was estimated at approaching $1,000,000. The same day, the fire attacked the city of Biddeford where the hospital was menaced, but flames were stopped by the fire department pumpers. Fortunately by 2 A.M. the following morning, the wind died down providing a brief respite for fire fighters. However, again on October 25 the cities of Biddeford and Saco were endangered but the fires were kept under control until light rains occurred on October 29.

No separate figure for the damage resulting from this fire has been reported. However, some 355 buildings were destroyed from this one major fire.

Waterboro–Newfield fires, York County

This burn developed from the merging of several separate fires which eventually cut a swath almost across York County from the New Hampshire state line almost to the coast, an airline distance of some twenty miles. This fire almost reached the Kenne-

bunkport fire area but was separated by the new Maine super highway which was not crossed by the fire. The number of acres burned in York County from these fires totalled 126,000. York County has been the leading lumber producing county in Maine, in 1946 producing 70,000,000 board feet, largely white pine, out of the total of 385,000,000 for the entire state; some 18.1 per cent. The Newfield fire started on Friday, October 17, and by the 21st had burned several thousand acres. Fire was advancing on Waterboro on a front some six miles long and had already destroyed several farm homes in Newfield. Fire fighters had been mobilized from Newfield, West Newfield and Limerick. Two pumpers responded from Cape Elizabeth near Portland, one manned by soldier volunteers from Fort Williams. The War Assets Administration provided 10,000 feet of 2½ inch hose. Most of the small towns and villages in Northern York County had relatively meagre fire protection and much of the outside help that might have been available was engaged in the Kennebunkport area. On Wednesday, the 22nd, a mile long backfire reportedly saved the village of East Waterboro from a fire sweeping from Ossipee Mountain, but the situation was complicated by a new fire at North Waterboro. Some 2,000 men were fighting these fires. After wires and cables burned, communications in the fire area were provided by State Police radio cars. Some one hundred oil and dairy trucks were mobilized to carry water. Pumpers from Westbrook and Gorham pumped from Lake Ossipee to save several buildings. Other homes were saved by fire fighters with shovels and back tank extinguishers. At one point, six fire department pumpers in a 9,200 feet relay saved a group of buildings. Other fire companies operating in the area were from Portland, South Portland, Gorham, Gray, South Windham, Cape Elizabeth, North Berwick, Ogunquit and Alfred.

Air view of ruins of twenty homes in South Waterboro also showing a number of buildings saved by determined fire fighters. Several new homes were begun as soon as the ruins had cooled.

The following day, October 23, the fire was seriously out of control in the North Waterboro section and was estimated to have extended over a fifty-two mile fire front. Route 5 was closed to traffic and the Maine National Guard was sent into action to fight the fire and guard property. On this day three-quarters of the village of East Waterboro was destroyed after several days of fire fighting and twenty-five cottages were destroyed at Ossipee

One of many homes destroyed in the village of North Waterboro when wind driven flames roared out of surrounding woodlands on Thursday, October 23.

Lake. At Newfield, only six homes were left after fire roared down Towles Mountain at 4 P.M., spreading from the region of Provence Lake at Wakefield, N. H. Nineteen homes were lost in Newfield, and fifteen homes and the Town Hall, together with all Town records, were lost at West Newfield. Also destroyed were several churches, a school and other buildings.

The village of North Waterboro was saved by an unexpected backdraft which temporarily trapped fire fighters and apparatus but took flames away from the settlement. At that time Clinton Davis of the U. S. Forest Service from Washington, D. C., reported that the situation appeared hopeless without heavy rain. No rain had fallen for twenty-three days. At Waterboro the Waterboro Box and Lumber Company was destroyed and 3,000,000 board feet of lumber was lost. On the same day, the lumber company at Scarborough, near Portland, was destroyed with a loss of 1,000,000 board feet despite help from six outside fire companies. Also on the morning of the 23rd, the State Pier at Portland was badly damaged in a three-alarm fire with an estimated loss exceeding $500,000. Though not resulting from forest fire communication, these last two fires demonstrate the explosive hazard conditions existing at the time.

The same day, the York County fire crossed Routes 111 and 35 in the towns of Alfred and Lyman destroying a number of residences, barns, filling stations and other structures. The following day, it was reported that thirty-five homes had been destroyed along a fifteen mile stretch on Alfred Road between Kennebunk and Biddeford.

On the 24th, fires from Waterboro, Lyman and Hollis were threatening the city of Sanford over a six-mile front. The fire was being fought by National Guard units. Radio equipped taxicabs proved helpful in providing emergency communications. While fire apparatus was stalled for an hour on Route 35 out of West Kennebunk by sightseers, flames destroyed settlements at Ross Corner, Lyman, South Hollis, and East Waterboro. Some 160 square miles of York County were swept by fire. The U. S. Forest Service Experiment Station near Shaker Village in the Town of Alfred was swept by fire. Although the main buildings at the station were saved, some four-fifths of the timber land in the experimental forest was burned and 14,000,000 feet of timber killed. However, lumber salvaging operations were started promptly.

Fryeburg–Brownfield fire, Oxford County

This fire which burned over 38,000 acres was the second largest of the Maine fires during October. Oxford County is just north of York County and adjoins New Hampshire. The point of origin of this burn has not been reported, but on October 21, the fire had burned over 5,000 acres and was reported travelling toward the New

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Air view showing ruins of estates in wooded suburbs of Bar Harbor.

Hampshire line. On the 23rd, this fire was reported as critical with the Town of Fryeburg in danger, although no buildings were reported lost at that time. However, the wind-driven flames spreading southeast destroyed the villages of Brownfield Center and East Brownfield, making some 600 persons homeless. Mass evacuation of the area was carried out as there was no hope of stopping the fire due to lack of water and fire fighting equipment.

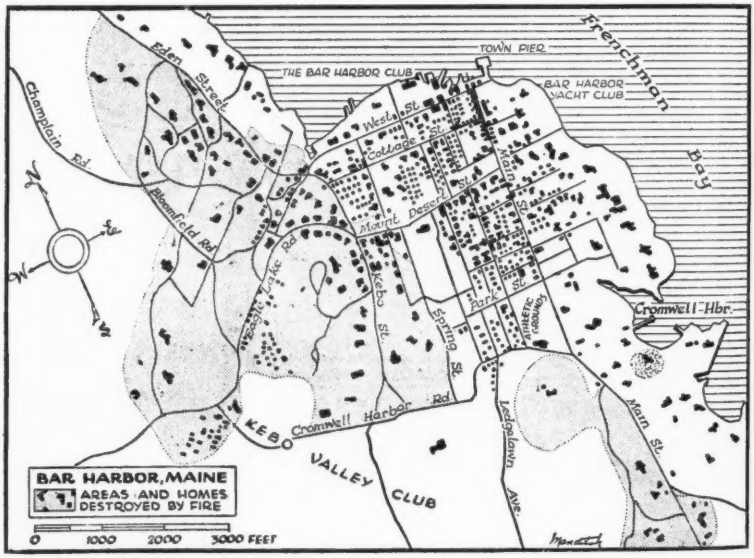
On October 24, the fire was brought under control in the Hiram and Cornish areas, but some 175 homes had been destroyed at East Brownfield alone. It has been pointed out that the Fryeburg-Brownfield fire became the second largest in Maine, largely by default. In the organized townships of Maine, fire protection, both forest and building, is a municipal responsibility although the state does meet half the cost of forest fire control. Brownfield with 1,900 people, including East Brownfield, reportedly had little or no organized fire protection. Denmark at the east of the fire area was likewise unprotected. Fryeburg with 1,700 persons had no pumper although the village had a hydrant system and apparatus consisting of a combination hose and booster truck, a ladder and chemical truck, and a hand-drawn hose cart. Cornish, with 800 population, had a portable pump, a hose and ladder truck, plus a hand-drawn hose cart and hand-drawn ladder truck. Hiram, with 700 population, was the only town in the immediate fire area with a 500-gallon per minute fire department pumper. Under ordinary road and weather conditions greater help might have been rushed from more distant communities, but at the critical time almost every fire department within many miles was fully engaged. It is reported that some of the small Maine townships may have to become unincorporated areas because of financial strain resulting from the costs of fire suppression, including labor charges. The total fire suppression bill has been estimated at between $400,000 and $500,000. In a number of

cases, fire fighting costs exceeded the annual budget of the communities involved. With a large proportion of the improved property burned, some of the towns are no longer solvent and may lose their corporate identity. These fires show that major forest conflagrations cannot be controlled by meagre or non-existant local fire companies without substantial aid and organization on a state or county basis. Local protection should be provided to cope with both building and forest fires in initial stages, but adequate trained personnel and equipment must also be available through a larger organizational plan to handle abnormal conditions.

Mount Desert Island–Bar Harbor fire

On October 21, the fire which had been burning on Cadillac Mountain south of Bar Harbor moved to within three miles of the congested resort city of some 4,400 permanent population. Several barns were destroyed and the town was reported without lights due to the destruction of a transformer. The fire, according to Fire Chief David A. Sleeper, was of unknown origin but may have started from hunters or cranberry pickers. The first alarm was telephoned by a passing motorist. The water supply in rural areas of the Island was very poor as streams were dry and fire fighters had to depend largely upon "booster" tanks on fire trucks.

The local fire department consisted of a chief, four permanent firemen, sixty call firemen, manning three pumpers, a hose truck, a combination ladder and chemical truck, a portable forest fire pump, 8,000 feet 2½-inch hose with national standard thread and 5,000 feet 1½-inch hose. Help was summoned from Northeast Harbor (having three fire trucks), Southwest



N. Y. Times

Fire area showing buildings destroyed at Bar Harbor, Maine, on October 23, 1947.

Acme

Fires swept down from Cadillac Mountain and Acadia National Park on Mt. Desert Island causing a major conflagration in the outskirts of Bar Harbor.

Harbor (one truck with trailer), and Somesville (two pumpers) all located on Mt. Desert Island, plus soldiers from Dow Field at Bangor.

On the 22nd, 450 volunteers and eleven fire departments were fighting this fire then covering an estimated 2,000 acres and which ultimately burned 17,200 acres. The fire involved a large area of Acadia National Park. No important buildings had been destroyed prior to October 23, which was the critical day as the wind blew at an estimated 50 mph and the fire destroyed some 272 homes and estates while 2,000 fire fighters made a determined stand which prevented the flames from entering the congested center of the town, consisting largely of closely built frame buildings. Good hydrant distribution, coupled with large mains and good water pressure, plus fifteen pumpers, and other pieces of fire apparatus, were factors which helped firemen, aided by Army, Navy and Coast Guard personnel hold the fire from the more congested areas. However, the fire fighters were not able to prevent the destruction of many large frame buildings, mostly with wooden roofs, in estates located in the wooded suburbs.

Perhaps the most serious individual loss at Bar Harbor was the destruction of the Roscoe B. Jackson Memorial Laboratory, a cancer research center housed in a two-story frame building with a wooden shingle roof. Some 100,000 white mice used in cancer research and research records were lost

Acme

Excellent water supplies and determined fire fighting by eleven fire departments stopped the spread of the Bar Harbor conflagration into the closely built wooden-frame congested district of Bar Harbor.

with damage estimated at $150,000.

Total destruction of taxable value in the Bar Harbor fire, and not including value to wild land, was placed at $1,453,430. Two lives were lost at Bar Harbor.

Acme

Palatial summer estates in the wooded hills surrounding Bar Harbor were an easy target for the 17,200 acre forest fire on Mt. Desert Island.

Other Maine fires

There were many other serious fires in Maine during the critical dry period from October 20 to 27. Among the largest were the 22,000 acre Centerville-Jonesboro fire in Washington County in eastern Maine; the 4,000 acre Cherryfield-Township No. 10 fire in Washington and Hancock Counties; the 3,300 acre Topsham fire and the 2,600 acre Richmond fire, both in Sagadahoc County in south central Maine; the 1,200 acre Livermore fire in Androscoggin and Kennebeck Counties; and the 1,000 acre Frye Island fire in Sebago Lake. On the 21st of October, a fire at the Brunswick town dump jumped the road and burned for five miles toward the city of Bath. The town pumping station was endangered but was kept going until the transformer was lost and power was cut off for three hours. Two hundred buildings and a veterans' housing project at the University of Maine annex were threatened and help was called from Lewiston, Bath, Freeport, Auburn and the Bath Iron Works.

Acme

Many of the homes and summer estates succumbed to fire because their wooden shingle roofs were vulnerable to flying embers.

The big fire in the Jonesboro-Machias area spread to within a quarter mile of Jonesboro on October 21 despite fire fighters from Addison, Machias, East Machias, Jonesport and Columbia Falls. The fire in

the Livermore area destroyed thirty-two buildings at the Methodist Camp Ground at East Livermore and burned to within thirty feet of a school located in the woods. This fire had started at a farm on that date and was fought by fire departments from Farmington, East Jay, Livermore and Fayette. Fire fighters were handicapped by lack of water as many wells were dry. However, bulldozers were used to construct firebreaks that saved the town of Wayne. On October 22, the Jonesboro fire was burning on a ten-mile front and help was rushed from the Dow Field air base near Bangor. On October 23, twenty-five dwellings in the Richmond Camp Ground were destroyed by the big Richmond fire and at South Gardiner twenty farm homes on River Road were destroyed by this same fire. The following day, Friday, October 24, the Centerville fire had destroyed twenty homes in Machias and the Richmond fire burned seven houses and a garage in that town.

In addition to the direct destruction of buildings and timber, there were many indirect losses from this series of forest fires. It is estimated that the State of Maine lost perhaps $250,000 in hunting license fees due to the necessity of closing the forest to hunters during the fire season. Sporting camp and resort owners placed their loss at several millions of dollars, although the season was later extended to make up for the time in which the woods were closed.

Other New England Fire Areas

In Strafford County, New Hampshire, adjoining the York County area in Maine, the forest fire situation was no less critical than in the neighboring state, but destruction of buildings was considerably less due to more effective local protection, prompt mobilization of all available resources and outside help. The city of Rochester was near the center of the fire area and was seriously threatened but was saved by determined and resourceful fire fighting. Among the fire trucks rushed to the area was apparatus from Dover, Somersworth, Portsmouth, Barrington, Lee, Northwood, Seabrook, Exeter, Newington, Durham, Concord, Manchester, Newfields, Laconia, Franklin, Loudon, Milton, New Durham, Alton, Portsmouth Navy Yard, and Grenier Field in New Hampshire, and Berwick and Lebanon in Maine. Some fifty tank trucks representing oil companies, tree sprayers, and many other trucks of all sizes were used to haul water in the various New Hampshire fire areas. About a hundred buildings were burned in the New Hampshire fires.

In Massachusetts, October 23, 1947, has been classed by Director Raymond Kenney of the State Division of Forestry, as one of the most threatening days in the history of the Commonwealth. A state of emergency was declared and headquarters were established in the office of the Massachusetts Adjutant General for emergency operations. Although some 15,000 acres were burned over, only thirty houses were lost due to the vigilance of local fire fighters aided by fire companies from outside communities, state forestry men and equipment, plus National Guard personnel. Despite several hundred fire calls in its own territory, the Boston Fire Department was able to dispatch eight fire companies to assist at critical points in both Maine and Massachusetts. One of the most

critical Massachusetts' fires occurred in the town of Falmouth on Cape Cod but after a three-day fight was controlled without the loss of a single building due to excellent fire fighting, strong water supplies and cooperation of the citizens who followed fire department orders and kept all exposed buildings in the path of the fire wet down.

Conclusions

In many areas of New England, serious fires were controlled by effective fire fighting. However, among the lessons of the New England forest fires was the need of greater over-all coordination for large scale operations during times of emergency when local fire fighting facilities may be inadequate. Also of importance was the need of maintaining active patrols and mopping-up squads until fires have been completely extinguished. There were a number of instances in which the fires that ultimately destroyed vast areas of woodlands and many buildings, had been smouldering or burning slowly for some days before abnormal weather conditions made them critical. Had such fires been extinguished at their first inception, much of the eventual damage might have been avoided. Part of this difficulty was due to the fact that call firemen harassed by frequent alarms were anxious to get back to their regular employment and were reluctant to stay all night on a fire line when they had work to do the next morning. It is reliably reported that in some cases, firemen were called back as many as a half dozen times to slow burning fires before the situation became critical. It is to be hoped that as a result of these fires some method will be worked out whereby state forestry officials can provide patrol service where required to see that forest and wood fires are not left unwatched until completely extinguished.

Several of the photographs used to illustrate this report appeared in a 16-page Pictorial Review of the "Maine Fire Disaster," consisting of 134 photographs printed by the *Kennebec Journal* of Augusta, Maine, and edited by the Guy P. Gannett Newspapers in Maine. This excellent review is available from the publishers at 50 cents per copy.

Airport Fires of 1947

Airport property fire losses totaling almost $10,000,000 were reported to the NFPA during 1947. This record clearly points to the urgent need for improved fire protection for this class of property. These fires, only 47 in number, destroyed 630 aircraft, 42 hangars, and at least ten other buildings. The average loss per fire is thus $212,766 and the average number of aircraft destroyed per fire is over 13. A few large fires influenced these averages, but a check of previous airport fire experience on NFPA records shows that in 187 cases (years 1923–1946) the average hangar fire loss totals $309,000 with 7 aircraft destroyed per fire. These exceedingly high averages are reduced significantly only in cases where automatic sprinkler protection is afforded, and in airport structures totally so equipped the average loss per fire on NFPA records drops to $2,000.

Not included in this review of airport fires are aircraft crash fires or individual aircraft fires in the open where no structures are involved. Adding these would further indicate the urgency of the need for improved fire protection for airports but the subject is one which is considered outside the purview of this analysis.

Summaries of the largest fires involving airport properties during 1947 are presented on the following pages. The seriousness of these fires has in many cases been due to wartime combustible construction and the failure of present owners and tenants to install automatic sprinklers or other adequate fire protection equipment. In many cases gasoline in aircraft tanks stored in hangars has been an important factor. In practically every instance, lack of adequate water supplies for fire fighting, delayed fire detection and alarm, and lack of adequately trained fire fighting forces quickly available, have been important contributing factors. The large losses have been due to large values involved in the contents of hangars and lack of adequate subdivision of areas.

This article also includes summaries of 6 typical fires at small airports which have occurred during 1947. This is only a small fraction of the total number of such fires which have occurred, but the 6 selected illustrate the fire problems found at most private and small commercial fields. While the dollar losses in this group of fires are relatively small, they may have even greater adverse effects on their owners and on the advancement of aviation than do the major fires at the larger airports.

Honolulu Airport Fire
June 10, 1947

There were eight fires with losses over $250,000. The largest single loss occurred at the John Rodgers (Honolulu) Airport on June 10, 1947 with the loss estimated at $2,000,000. This was the first major fire on NFPA records involving a "dock" type hangar. The building was a totally enclosed structure (in this way differing from a "nose" hangar) and was constructed during the war under U. S. Navy emergency specifications. The following structural deficiencies were significant factors in the fire:

1. The use of wood (frame) construction in a structure 666 feet long, 90 feet wide

Hawaii Rating Bureau

This photograph of the Dock Hangar fire at the John Rodgers (Honolulu) Airport, June 10, 1947, was taken at 11:15 p.m., 35 minutes following first detection. It shows the last section of the 666 ft. long building to become involved. Note the wind direction, the end of the fire wall, and the remains of the overhanging roof.

Hawaii Rating Bureau

The fire walls in the dock hangar at Honolulu were left standing following complete burnout of the structure. Fire spread around the ends of walls which did not extend through the overhanging roofs.

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(excluding overhanging roof) and three stories (41 ft. at roof peak) in height (total floor area: 219,780 sq. ft.; cubic space: 3,996,000 cu. ft.). In addition, elaborate partitioning of the interior of the hangar with light wallboard added an unusual amount of highly combustible material.

2. Lack of automatic fire detection and extinguishing equipment. When originally constructed during the war, automatic protection equipment was not available but since that time nothing was done to provide the facilities.
3. Failure to provide effective fire division walls to sub-divide the large area.
4. Unprotected vertical openings (stairwells).

The hangar had five "docks" on each side of the 666-ft. long structure. These "docks" did not penetrate the structure but were covered by a 30 ft. wide wood, cantilever truss roof which extended longitudinally on each side of the building for its full length. Two so-called "fire walls" were constructed in such a manner as to theoretically divide the building into three sections each approximately 20,000 sq. ft. in area, but, because they extended only one foot from the side walls and did not extend either through or across the width of the overhanging roof, their value was negligible. Upper floors were divided into office, storage and work shop areas for use by Pan American, United, Pacific Overseas, and Trans Pacific airlines.

The fire was discovered by one of a few night employees on duty at the airport about 10:40 P.M. but the first alarm was not given until 10:53 (13 minute delay). The alarm was subsequently relayed to the Naval Air Facility (one mile distant) at 10:55, to the 14th Naval District Fire Station at Pearl Harbor (4 miles) at 10:57 and to the City of Honolulu at 11:05. It was 25 minutes after receipt of the alarm before 15 pumper companies were assembled and engaged in fire fighting operations. In the meantime the fire had advanced rapidly.

One entire end of the building was in flames within 10 minutes of the first alarm, as photographs taken during the early minutes proved (see p. 210). By 11:15 the roof and main vertical members in two of the three 222 ft. by 90 ft. sections had collapsed. Firemen who had first attached hose lines to hydrants near the building (only 20 ft.

distant from outside edge of overhanging roofs) were forced to retire due to the terrific heat. By 11:20 P.M. most pumpers were drafting from a lagoon 450 ft. from the hangar. A total of 35 hose streams were in service by this time (average 200 gpm each). These hose streams were totally ineffective and the fire spread from one end of the structure to the other against a 12 mph wind.

It was obvious that the fire passed around the fire walls with flames feeding on the combustible overhanging roof. After the fire, the fire walls themselves (masonry hollow blocks 16, 12, and 8-inch thickness) were standing and in comparatively good condition and single fire doors (three openings per wall on first and second floors) showed evidence of proper operation despite the fact that they were sub-standard in some aspects.

While the actual cause of the fire will undoubtedly remain a mystery, the following facts make the actual determination of cause of only academic interest:

1. There was indiscriminate smoking throughout the building.
2. Housekeeping practices were bad, particularly in the storage of oily rags and waste materials. This was influenced by the multiple tenants sharing the building and the lack of a firm fire prevention policy on the part of the lessors. (Shortage of qualified personnel handicapped the lessor according to our information.)
3. Flammable solvents and possibly gasoline were commonly used as cleaning solvents in mechanical and maintenance operations and large quantities of flammable liquids were stored in the building. (Twelve 55-gal. drums of aviation gasoline were known to be in the building at the time of the fire.)
4. There was no watchman service or automatic alarm service provided during inoperative or inactive periods.
5. It was reported that on the second and third floors it was customary to polish flooring, uprights and walls twice a week with a preparation consisting of gasoline and wax.
6. Aircraft parts maintenance, which is often hazardous, was being conducted in the building. Aircraft undergoing maintenance in the occupied docks contributed markedly to the propagation of the fire. Two aircraft, a Navy C-54 four-engine transport and a Douglas DC-3 commercial transport plane, were destroyed.

Hawaii Rating Bureau

Note wind direction which was directly opposite to spread of fire (left to right) in Honolulu hangar.

Goose Bay Airport Fire January 10, 1947

The second largest fire involved a war-built aircraft maintenance hangar on the American side of the Goose Bay Airport, Newfoundland. The entire building was destroyed by the fire which was discovered by passing civilians at 4:30 A.M. As fire equipment reached the scene, flames were observed coming through the roof and a great amount of heavy, black smoke was pouring from the 45,000 sq. ft. all wood structure. Pumpers went into immediate action pouring high pressure streams on the inferno but an explosion soon after laying the first line made all attempts to save the structure hopeless. Flying embers endangered nearby buildings but Base personnel extinguished all incipient fires in exposed structures.

Two C-54 aircraft stored within the hangar were lost as well as all the maintenance and overhaul equipment installed in the building. A temperature of —14°F. complicated fire fighting activity. Crash trucks used to patrol the Base during the fire were forced to return to quarters as

their water supply froze. The cause of the fire could not be determined but previous inspections had condemned open flame heaters used in the hangar. These had not been removed at the time of the fire. The loss estimates released by the AAF are: building, $650,000; aircraft, $356,000; other contents, $606,950; total, $1,612,950.

Miami International Airport Fire
August 6, 1947

This fire was the third largest of the year with the loss estimated at $1,000,000. The total destruction of a 300 ft. by 210 ft. unsprinklered hangar of combustible construction points forcefully again to the need for realistic fire protection. The structure, also built during the war was actually a "double" hangar (single fire area) with steel reinforced wood structural elements (walls and roof framing). A reinforced concrete foundation carried the structural load with the steel members designed to provide anchorage against possible windstorm damage. The hangar at the time of the fire was under the management of the Dade County Port Authority and subleased to four occupants engaged in aircraft maintenance and storage.

The alarm was received by telephone by the Port Authority operated fire department at 1:46 A.M. with the call placed by the Control Tower. The airport fire station was located in close proximity to the hangar and within two minutes a single 2½in. hose line (from a hydrant 210 ft. from the burning building) was in service. A straight stream was used on a gasoline spill (where the fire originated) and this action had a scattering effect on the fire, spreading the flames over the grease covered floor. Subsequent explosions of full or partially full aircraft fuel tanks further spread the fire the length and breadth of the hangar and to the roof. It became obvious that all subsequent efforts would have to be exerted in removing aircraft parked in seriously exposed positions and to protect adjacent structures.

Volunteers among airline employees, port authority personnel and others in the vicinity are credited with saving from almost sure destruction 21 aircraft, including seven AT-6's, Lockheed Lodestars, four DC-3's, two PBY's, two A-26's, and one DC-4. The eleven aircraft destroyed by fire included three Lodestars, two DC-3's, two Beechcrafts, one Grumman, one Fairchild, one Howard Racing plane and one converted A-26 medium bomber. Other valuable contents of the hangar lost in the fire included spare aircraft engines, propellers, tires, spare parts, repair and testing equipment, radio components, precision tools and machines, office equipment and records.

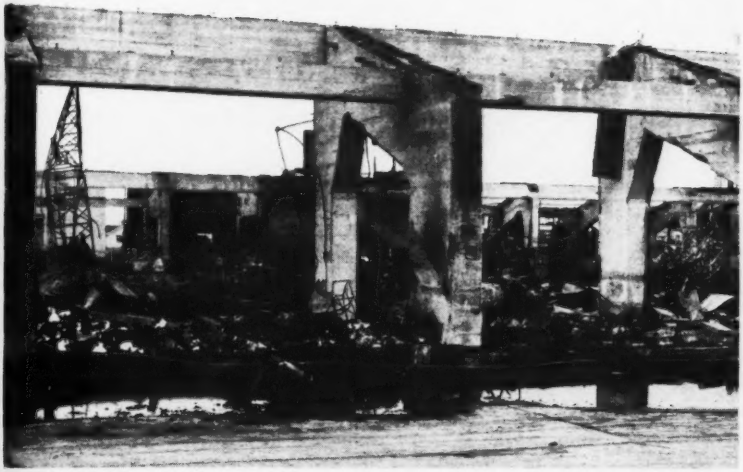
The Control Tower operator called for outside aid from Hialeah (1:48 A.M.), Miami Springs (1:50 A.M.) and the City of Miami (1:53 A.M.). Hialeah did not respond (fire considered out of their jurisdiction) but Miami Springs arrived at 2:05 and three companies from Miami reached the scene at 2:07 and 2:09. The Opa Locka Fire Department responded on their own volition, having observed the fire at 2:20. and arrived at 2:35. Difficulty in finding water supplies delayed utilizing the additional equipment. Miami Springs sought water connections for five minutes and finally was forced to lay 1,200 ft. of hose to secure one line. Chief Chase of the Miami Fire Department could not find anyone on the scene who could advise his men as to an additional water supply source (available hydrants being used). At least twenty minutes elapsed before a well (concealed by tall grass) was discovered. The best Miami could do by this time was to join others in attempting to protect exposed property but a second building (containing dope and paints) became involved before effective hose lines were available and was quickly destroyed. Opa Locka equipment could not be used because of water shortage. The fire burned itself out by 5:35 A.M., three hours and 49 minutes after discovery.

The cause of the fire has been attributed to a static spark igniting gasoline being drained from the wing tanks of a plane into an open drum. It is known that a considerable spillage of fuel accompanied this operation, but the static spark theory is not well substantiated.

One interesting side light on the fire is that the Florida State Improvement Commission, concerned over fire losses at airports, attempted to pass through the state

R. E. Pierson

This photograph of the Miami International Airport Hangar fire shows how totally the wood structure was involved following ignition of aircraft stored in the building. Lack of automatic protection and adequate water supplies handicapped attempts to secure control. Eleven aircraft were destroyed. Loss estimated at $1,000,000.



Edmonton Journal

This view of the remains of the Hangar at Edmonton shows how the combustible roof and sidewalls were totally destroyed in the fire of June 12, 1947. This fire originated in one of the planes stored in the Hangar, presumably from an electrical short circuit. The loss is estimated at $700,000.

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legislature a bill which would give them airport licensing authority. One purpose of the measure was to provide inspection services to assure fire safety. According to William C. Lazarus, State Aviation Supervisor, the Dade County Port Authority fought successfully to exempt public airports from the licensing provision with the result that the present Bill (No. 733) covers only privately owned airports. It is also of interest, that eight days prior to this fire, the Army sponsored and equipped fire department at this field was cut from 32 men to 8 and the two major crash trucks were withdrawn from service.

Rosecrans Airport Fire July 23, 1947

The fourth major loss involved another large wood, war-time, hangar lacking automatic sprinkler protection at Rosecrans Airport, St. Joseph, Missouri. The structure, 212 ft. long, 162 ft. wide and 40 ft. high, was occupied by the St. Joseph Aviation Sales Company who were engaged in converting surplus Army transports into cargo carriers. Two four-engine DC-4's were in the hangar at the time of the fire, one of which was ready for delivery with its tanks containing 2,800 gallons of gasoline.

The flames were first noted at one corner of the hangar by a watchman at 2:38 A.M. The location suggests that the cause might have been a defective motor installed to operate the hangar doors. A delay in transmitting the alarm resulted when the watchman failed to use either of two box alarms in the immediate vicinity, confused a local hangar "alert" system with the fire alarm system and finally ran to the airport station of the St. Joseph Fire Department about 500 ft. away to give the report. As the first equipment reached the scene one entire end of the hangar was involved. Almost immediately after the first hose line was laid it was destroyed by a surge of flame, attributed to the ignition of the fueled DC-4. While this line was immediately replaced and the airport equipment was backed up by units from the city, (responding from stations 3 and 4½ miles away), the situation was hopeless. To make matters worse, a serious exposure condition existed, consisting of a frame machine shop and ware-

house, 212 ft. long and 120 ft. wide, 50 ft. from the burning hangar. Despite attempts to protect this structure with two hose lines, the flames soon also engulfed the building.

Fire defense tactics were then changed in the hope that part of the machine shop might be spared, and that other closely grouped buildings of light wood construction might be saved. These other threatened buildings included the boiler house, a parachute building and a former radio office, none of which were separated by more than 25 ft. of clear space. These efforts were successful despite radiated heat which blistered and scorched the three buildings.

Four pumpers and one ladder truck were in service during the fire and four major hose lines were used. Three fire hydrants in the area were accessible while two others were too close to the burning hangar to permit their use. Hydrant pressures were at first 50 psi but later increased to 90 psi by throwing in a deep well pump. The grid water supply system consisted of six and eight inch mains.

Chief Leo J. Urbanski of the St. Joseph Fire Department commented as follows on the fire: "Automatic sprinkler or alarm service might have prevented the large loss. The frame construction of all buildings and their large open spaces, combined with their close grouping, created a heat condition that made it almost humanly impossible to overcome. The occupant of the 60 ft. control tower, manned 24 hours a day, reported no alarm." The loss was $300,000 for the buildings, $520,000 for contents, including the two aircraft destroyed (hangar and contents $715,000, warehouse and contents $105,000). Total $820,000.

Edmonton, Alberta RCAF Fire June 12, 1947

Fire in a stored aircraft caused the total destruction of another large, unsprinklered hangar of combustible construction erected to serve war needs. One other aircraft, two vehicles, and miscellaneous aeronautical maintenance equipment were also totally destroyed. Flames were first observed in a Norseman plane at 1:30 A.M. by two mechanics on duty at the Royal Canadian Air Force Station. One mechanic phoned the fire department while the other attempted to use available extinguishers. While such action was commendable, the fire was too large to extinguish with hand equipment and it was also impossible to drag the burning aircraft from the structure. The RCAF fire department at the airport responded immediately with their two pumpers and two crash tenders. Edmonton fire equipment was also called and answered with five pumpers and 16 men. Despite sufficient water supplies and good fire fighting tactics, the entire structure was quickly involved. The open, wood-joisted roof framing ignited quickly causing roof collapse. Fortunately a B-29 and several P-61's ("Black Widows") on the flight line were towed from the danger area before becoming involved.

While the cause of the fire could not be determined with accuracy, it is believed that the aircraft electrical system was responsible.

The only portion of the hangar which was saved was the heating and electrical plant which had been cut off from the undivided area. Loss is estimated at $700,000 including the building and its contents.

Bromma Airport (Sweden) Hanger Fire October 14, 1947

Not all the hangar losses occurred in North America. Poor construction and protection of this type structure are as world wide as aviation itself.

From NFPA members in Sweden we learned that a 164 ft. by 65 ft. wood hangar owned by Aktiebolaget Aerotransport (ABA) at Bromma Airport was destroyed by a fire which was discovered by a night watchman at 4:00 A.M. The alarm was telephoned to the Stockholm Fire Brigade but the combustible structure was so heavily involved that little could be done by the fire fighters with the limited water supply available. The building was used principally as a garage and 20 automobiles (including eight buses) owned by ABA were lost. In addition, American Overseas Airlines lost replacement parts and four aircraft engines stored in the building.

A particularly ironic feature of the fire was that the airport fire truck, garaged in

the hangar, was also totally destroyed. Fire fighters used fourteen large hose lines and four smaller lines in their attempt to extinguish the fire, employing straight streams and foam. One truck of the Fire Brigade was partly damaged. Losses, as given to the NFPA, were: building, 100,000 Kronors (Swedish currency); contents, 1,500,000 Kronors. At present exchange rates (3.6 Kronors in $1.00) the building loss is approximately $28,000 and the contents loss $417,000. Total $445,000.

Aircraft Plant in Copenhagen Destroyed February 17, 1947

The Kramme and Zeuten (Scandinavian Industry Company) aircraft manufacturing plant in Copenhagen was destroyed by a fire believed to have originated from defective electrical wiring near the wood roof of the hangar-like structure. Fifty airplanes were lost and the building totally destroyed.

Delayed detection was evident as the night furnace man, who first observed the flames at 5:00 A.M. and gave the alarm to the Copenhagen Fire brigade, was not able to use hand fire extinguishers successfully. In addition to this delay, seven minutes elapsed before fire equipment could reach the plant, located in a remote area on the harbor front. Information as to the type of aircraft involved is limited to the fact that they were two-seater planes. The loss to building, machinery, and aircraft was estimated by the Danish Fire Protection Committee at one million Kronors ($250,000).

Hicks Field Fire near Fort Worth, Texas August 5, 1947

Not all airport fires involve or originate in hangars. Section crews burning grass from a nearby railroad right-of-way are blamed for the fire which swept over Hicks Field to destroy 300 BT-13 training planes, a pump house, a gasoline service station, and one hangar containing 10,000 bales of hay, 700 empty airplane motor cartons, 1,000 aircraft batteries and 200 tires. The fire spread very quickly over the open airport area and engulfed the stored aircraft on the field before frantic employees could take any successful action to remove them.

Fire equipment from the City of Fort Worth, the Army Air Field, Naval Reserve and National Guard units responded to calls for assistance but their efforts were hampered when the electric power line supplying current for the fire pump at a 50,000-gallon storage tank burned in two. High dry grass plus a stiff wind were chiefly responsible for the impetus gained by the fire and close grouping of the army surplus aircraft made them easy targets for the flames.

The loss is estimated at $300,000. This figure is a local press estimate and the only one available as the owner has not replied to requests for information which might permit a more accurate evaluation of the damages. The newspaper added that the owner stated: "the buildings, planes and stock were valued at $1,000,000 on a salvage basis."

Mustang Airport Fire February 5, 1947

A series of adjoining wood and metal "T" type hangars were destroyed along with seven personal aircraft at the Mustang Airport near Dallas, Texas, by a fire which originated in grass along an adjoining highway. Failure to plow the ground to provide a fire break in this area was a shortcoming specifically mentioned in the report. Other grass areas, which constituted a threat to airport structures had been plowed for this purpose.

The "T" type hangars abutting each other created a building 500 ft. long, 12 ft. in height, which lacked structural fire stops. Once aircraft stored in the individual "T" hangars were ignited, the damage was bound to be total for the portions affected. The only planes which could be saved were those reached and manually withdrawn before they became involved. Opportunity to remove planes was greatly handicapped by delayed detection.

The watchman on duty was on the other side of the airport when he was notified of the fire by a passing motorist. The alarm was immediately given by telephone (10:21 P.M.) but flames were through the roof by the time city equipment could reach the scene. Firemen saved some planes from hangars not affected and the fire was

stopped after the first seven units were destroyed.

Fire fighting was accomplished with 2½-in. hose lines supplied by water drafted from an earthen reservoir 600 ft. from the hangar. This tank, covering approximately two acres, was originally the water supply source for cattle. Fortunately there was water available although, during the hot summer months, the tank dries up leaving the airport without water for fire suppression purposes. The loss totaled $30,000 ($25,000 on contents, including aircraft).

Capitol City Airport Fire
February 6, 1947

The hangar of the Harvey Hughes Flying Service at the Capitol City Airport near Lansing, Michigan, was totally destroyed by a fire which was out of control before city apparatus could reach the scene. The airport is located five miles from city limits and is without a water supply except for a small lake located approximately 500 feet from the airport. The fire department used two pumpers at the scene and took suction from the lake. Water-spray hose lines were employed.

The hangar was the conventional type with concrete block walls and steel truss roof framing with composition board and asphalt roof covering. Discovered by a mechanic who was working on a plane at 8:15 A.M., the cause has been listed as "apparently either a shorted electric drop cord or an electric light bulb in contact with flammable material." One mechanic suffered face burns. Loss: building, $20,000; contents, $20,350; total, $40,350.

Big Spring, Texas Hangar Fire
February 22, 1947

With only 250 gallons of water available in the booster tank of one fire truck the Fire Chief recommended that the 72 ft. square, 12 ft. high, all metal hangar be left closed and that all efforts be concentrated on saving seriously exposed, adjacent wood hangars. This decision was as admirable as it was unusual. The following circumstances will substantiate this opinion.

The owner of the U & S Flying Service arrived at the airport at about 7:30 A.M. When he reached the hangar he noted smoke coming from around the edges of the door. Unable to quickly operate the lock, he ran to the office and telephoned the fire department which responded within five minutes. The Chief noted through a small door that the entire hangar was filled with dense smoke and considerable flame but that the welded steel pipe framework and the all metal roof and walls were confining the blaze without imminent danger of structural collapse. He knew that opening of the main hangar doors would only aggrevate the fire and supply it with more oxygen. His severely limited water supply would make fruitless any attempt at control. Protecting exposures required confining the flame and limiting radiant heat. The best manner for accomplishing this was to use the metal hangar structure as a natural barrier rather than to attempt control with the 250 gallons of water available.

The contents (13 light planes) were totally destroyed, the hangar structure slightly buckled and smoked, but the exposures were saved. Fortunately, there were no explosions of partially filled aircraft fuel tanks. Cause of the fire was failure of an electric wire between the point where it entered the hangar and an outlet receptacle about 4 feet above the floor level. Loss to aircraft aggregated $23,000 while the structural damage was only $6,180; total, $29,180.

Erie Institute of Aeronautics Fire
(near Erie, Penna.) March 17, 1947

The Institute occupied a structure approximately 150 feet long and 80 feet wide of mixed construction. One section (50 ft. by 80 ft.) was used as the repair shop and office and two adjoining units of similar size were used as storage hangars. The repair shop proper was constructed of corrugated iron on wood frame while the other units had concrete block walls with sheet aluminum doors and roof. The division partition between the repair hangar and first storage unit was unpierced wood frame and corrugated iron. The partition between the two storage hangars was concrete block with a single wood door at the only opening.

Fire was first observed by a neighbor at 1:10 A.M. and at that time flames were issuing through the roof at the rear of the repair hangar. A telephone call brought the Kearsarge Hose Company to the scene but by the time of their arrival explosions had spread the fire to the offices and the first storage hangar. Quantities of cleaning liquids and gasoline in the tanks of the aircraft involved intensified the fire and the volunteer firemen concentrated on saving the third section and dragging planes in this latter portion to safety.

The only water available was that supplied by booster tanks and quantities that were hauled by tank truck to the scene. No water mains, hydrants, or convenient reservoirs were available. A heavy snow storm and below freezing temperatures also complicated fire fighting efforts. Fifteen aircraft were destroyed including a twin-engine Cessna, thirteen Piper Cubs, and one PT-6. A Link Trainer, twenty-two parachutes, aircraft parts and accessories, and extensive records for the school were lost.

Damage to the three-unit structure was approximately 75 per cent with general collapse of all wood framework and unprotected steel girders. The fire illustrates why it is a bad practice to combine aircraft maintenance and storage facilities in a single fire area. The cause of the fire remains uncertain as no one (not even a watchman) was on the property at the time and destruction of the repair section (where the fire started) was 100 per cent. Loss: building, $40,100; contents, $106,600; total, $146,700. (Total value estimated at $205,895.)

Rosemead, California Hangar Fire
July 20, 1947

Seven private planes in a Quonset hut type all-steel storage hangar (40 ft. by 100 ft.) at Rosemead Airport were destroyed by a suspicious fire which originated in one of them about 5:35 A.M. Two other aircraft immediately outside the hangar were also damaged. An employee discovered the fire and notified a watchman who called the Los Angeles County Fire Department for assistance. While the flames spread with great rapidity and involved the entire contents of the hangar before fire equipment could reach the scene, the County firemen secured extinguishment within 30 minutes by the use of water spray. The hangar itself was only slightly buckled by the heat. A water tank truck with a capacity of 300 gallons was available and this amount was fortunately sufficient. The nearest hydrant was a quarter-mile distant. This fire illustrates benefits of having fire fighting facilities available and in the hands of skilled operators. Three one-inch hose lines with fog nozzles on six-foot applicators were used, one covering exposed aircraft and the others working on each side of the line of aircraft involved in the fire. The time element in the response of equipment in this instance was eight minutes and was rated very good as the distance travelled by the fire equipment was approximately 3.8 miles and the route had several right angle turns which slowed the response.

An interesting feature in this fire was that the seven aircraft were stacked on nose blocks in the hangar, a necessary procedure to accommodate all the aircraft needing storage. Hangar doors were open on both ends and a three-to-five mile per hour easterly wind was blowing at the time of the fire. This wind had the effect of intensifying the incipient fire and speeding the spread to the other planes. Obviously, no aircraft could be withdrawn to safety under such conditions. Doped fabric, gasoline (45 gallons estimated), and the wood prop blocks added fuel to the fire. After the fire, gasoline was observed dripping from the aircraft fuel tanks, as a result of heat expansion. The aircraft lost included six Aeroncas, one Luscombe, one Rearwin, and one PT-19. Insurance payments are estimated at $9,800 with the actual loss set at $20,000.

Prince Albert, Saskatchewan Fire
August 2, 1947

At 3:40 A.M. a barking dog aroused a resident of Prince Albert. It was then that the fire in the hangar of the Saskatchewan Department of Natural Resources, almost a mile away, was reported to the City Fire Department. Subsequent investigation showed that the watchman on duty was

prevented from giving the alarm as the fire quickly destroyed the wires for the only readily available telephone. It is doubtful, however, that the fire would have been reported by the watchman in time to save the property since his last round was five hours earlier (10:30 P.M.) and the flames had a marked grip on the wood hangar (165 ft. wide, 162 ft. long and 32 ft. high) when he first became aware of the trouble. Such sub-standard watchman service is of little value.

Originating in or around the fabric wing shop in a lean-to, the fire spread quickly, destroying the entire building, four aircraft and one new aircraft engine in its original crate. Automatic sprinklers in the engine repair room, dope shop, and welding shop (coverage totaling: 4,698 sq. ft.), but not in the balance of the combustible building (total area unprotected: 22,032 sq. ft.), were overcome by the advanced wall of fire, although all heads opened and operated. Partial sprinkler protection in a hangar of this type construction and occupancy could not be expected to succeed unless the fire originated in the area so protected.

Fire fighters were handicapped when they found the booster pump at a 100,000 gallon reservoir (250 ft. distant) out of service. Ordinary pressures of 60 psi at hydrants on a six-inch main were thus not available and it was necessary to use the pumper equipment to get four good hose lines. Fire fighters were forced to concentrate on saving wood buildings, the closest only 40 feet away and they succeeded in this mission aided by a favorable wind.

Lost in the hangar besides the aircraft and new engine mentioned above were a crash truck, an oil tank truck, radio broadcasting equipment, machine tools used in engine overhaul, and mechanics' tools (about 18 sets valued at $500 each). The cause of the fire is under investigation by the Royal Canadian Mounted Police. Losses are divided $20,000 for the building, $75,000 for contents.

Neuman Studio, Fort Wayne, Ind.

This fire at Baer Field, Fort Wayne, Ind., December 4, 1946, illustrates the vulnerability of unprotected steel framework in a structure lacking automatic sprinkler protection. The loss was estimated at $205,950 for structure alone and $20,475 to contents (no aircraft involved).

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This 100,000-gal. Horton elevated water tank patrols the pressure in an automatic sprinkler system at the Mississippi Products, Inc., plant in Jackson, Miss. The primary water supply for the sprinkler system is obtained from a 10-in. city water main. The water in the tank cannot flow into the sprinkler system until the pressure in the city main drops below 50 lbs. per sq. in.

Write our nearest office for quotations whenever you are making plans for fire protection installations.

CHICAGO BRIDGE & IRON COMPANY

CLEVELAND	CHICAGO	BIRMINGHAM	NEW YORK
HAVANA	DETROIT	ATLANTA	PHILADELPHIA
HOUSTON	TULSA	LOS ANGELES	SAN FRANCISCO

Plants at Chicago, Birmingham and Greenville, Pa.

At Last!

A WATERFLOW SWITCH *with INSTANTLY RECYCLING PNEUMATIC RETARD*

(No build-up)

Easily set for any period up to one minute.

- **Underwriters' Approved**
- **Paddle of Non-corrodible Monel**
- **Bell Wiring is Only Electrical Connection**
- **Easily Installed in All Sizes From 2½" Up**
- **Eliminates False Alarms due to Water Surges**

Where many waterflow alarms are anticipated, a transmitter can be substituted for the switch thereby saving enormously on the wiring system as only two wires would be necessary to take care of any number of transmitters. No necessity to reduce number of alarm valves due to cost. Night watch and fire alarm boxes may be installed on same wiring with waterflow transmitter system. Easily installed by merely drilling a one and seven-eighths inch hole in pipe.

WRITE FOR FULL DETAILS

CENTRAL STATION SIGNALS, INC.

MANUFACTURERS OF FIRE PROTECTION EQUIPMENT

71 WEST 23rd STREET -:- NEW YORK 10, N. Y.

THOSE RECORDS— ARE THEY SAFE?

VITAL BUSINESS RECORDS are needed not only to give evidence of the character and amount of the property destroyed; often the very ability of a business to go on after a fire depends on them. They should be safely protected under even the most adverse fire conditions.

Thousands of case histories in the hands of the Underwriters' Laboratories, Inc., The National Fire Protection Association, and the Safe Manufacturers' National Association indicate that all safes made prior to 1917 as well as many unlabeled safes made since that time are obsolete in construction, untrustworthy and deficient in fire-resistance qualities according to present-day knowledge and testing standards and, therefore, of uncertain protective value.

It is also the considered opinion of this Association that uninsulated steel plate-type, vault or safe doors with or without inner doors should not be used for the protection of valuable records, documents or merchandise.

The undersigned members of this Association have availed themselves of the improved standards that have been developed and pledge themselves to a strict observance thereof.

SAFE MANUFACTURERS' NATIONAL ASSOCIATION
366 MADISON AVENUE, NEW YORK 17, N. Y.

DIEBOLD INCORPORATED, Canton, O.
HERRING-HALL-MARVIN SAFE CO., Hamilton, O.
MEILINK STEEL SAFE COMPANY, Toledo, O.
THE MOSLER SAFE COMPANY, Hamilton, O.
PROTECTALL MANUFACTURING CORP., Syracuse, N. Y.
REMINGTON RAND, INC., Marietta, O.
THE SHAW-WALKER COMPANY, Muskegon, Mich.
THE VICTOR SAFE & EQUIPMENT CO., No. Tonawanda, N. Y.
YORK SAFE & LOCK COMPANY (Division of Diebold Incorporated), York, Pa.

Quality

is the keynote in design and installation

of

CENTRAL AUTOMATIC SPRINKLERS

If you wish the most
advanced design, manufactured and installed upon
highest quality standards
you will insist upon

CENTRAL SPRINKLER SYSTEMS

Wet Pipe Systems
Dry Pipe Systems
Thermostatically Operated Systems

They Pay for Themselves
in Savings and Security

CENTRAL AUTOMATIC SPRINKLER CO.

Fourth Street and Cannon Avenue

LANSDALE, PENNA.

Representatives in Principal Cities in United States and in Foreign Countries

New Trigger Grip Speeds Attack on Plant Fires

Requiring only the pressure of a single finger to operate it, the trigger-control valve now supplied on all 10-, 18- and 20-pound sizes of Kidde Portable Extinguishers speeds the attack on fire by providing faster starting of the carbon dioxide discharge.

The natural way to operate extinguishers with this new valve is the right way: merely aim at the fire and pull the trigger. The valve can be easily locked in the open position, if desired, simply by a slight forward movement of the trigger. As all the working parts are fully enclosed, there is no danger of the valve's becoming fouled.

Full information on the trigger control valve may be obtained from Walter Kidde & Company Inc.

Free

"Show-'em-How" Book on Fire Fighting

Demonstrate to your employees just what to do in case of fire. Free booklet tells you how. Write for copy.

Walter Kidde & Company, Inc., 151 Main Street, Belleville 9, N. J.

Kidde

SAFE . . . SIMPLE . . .
FAST-STARTING . . .
FOOLPROOF

15 pounds of carbon dioxide.
Single-finger control.
Simple lock-open operation.
Working parts enclosed — cannot foul.

Mail and Phone Orders Filled

Kidde

NEVER-NAPPING WATCHMAN

Works on rate of temperature rise. Sounds alarm, and operates extinguishing system automatically. Supplied as part of complete Kidde built-in systems. Other types of detection for automatic operation also available.

Kidde

Bargain in Fire Fighting!

Gets to fires fast—and hits them hard. Combines the wallop of a built-in system with the flexibility of application of a hand portable. Model 50 (illustrated) has 50-pound carbon dioxide capacity. Also in 75-pound and 100-pound sizes.

MAIL AND PHONE ORDERS FILLED

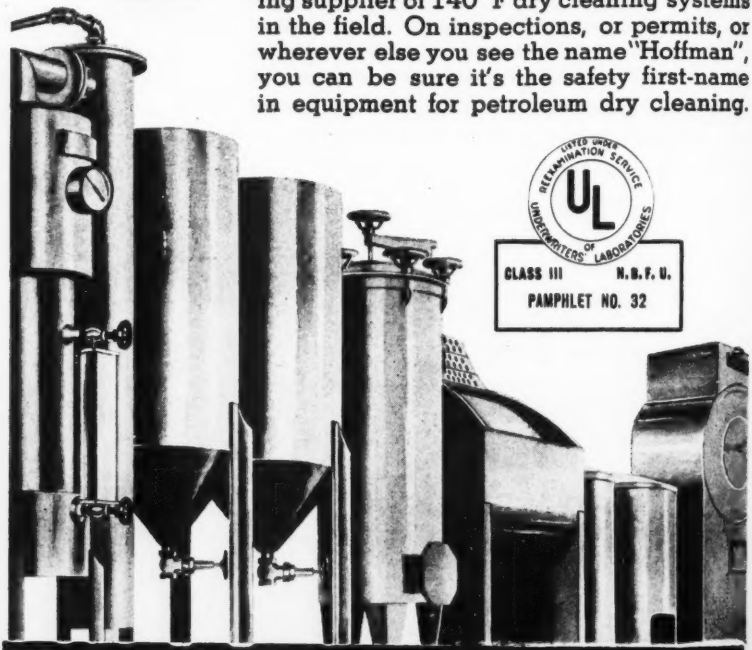
Walter Kidde & Company, Inc. • 151 Main Street, Belleville 9, New Jersey

This advertisement is one of a series appearing in leading industrial magazines, and planned to encourage more extensive use of fire protection equipment.

PROVED by a 12-Year CLEAR LOSS RECORD

HOFFMAN 140-F UNITS FOR SAFE DRY CLEANING

Year after year, the safety of commercial dry cleaning with 140° flash-point, petroleum solvent has been proved by Hoffman equipment. Hoffman originated the process in 1935 and, ever since, has been the leading supplier of 140° F dry cleaning systems in the field. On inspections, or permits, or wherever else you see the name "Hoffman", you can be sure it's the safety first-name in equipment for petroleum dry cleaning.



LISTED UNDERWRITERS' EXAMINATION SERVICE UL OF UNDERWRITERS' LABORATORIES
CLASS III N.B.F.U.
PAMPHLET NO. 32

U. S. HOFFMAN MACHINERY CORPORATION
105 Fourth Ave., New York 3, N.Y.
DRY CLEANING LAUNDRY & GARMENT PRESSING EQUIPMENT

FLEXIBLE FIRE PROTECTION
ONE UNIT TWO USES

A Fixed Carbon Dioxide Hose Rack . . .

A Two-Man Large-Volume Portable Extinguisher

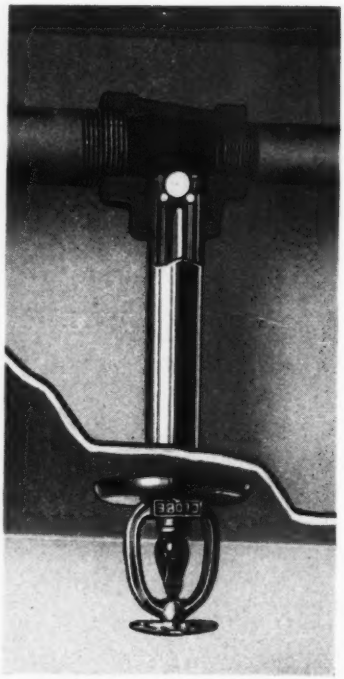
The new C-O-Two Fixed and Portable Hose Rack gives you big-volume, wide-radius fire protection. Attached to the wall near a particularly hazardous spot, it is ready for instant use with 25 feet of hose. For fires in remote areas, with a flick of the quick-release clamps, it becomes a two-man portable with 50 pounds of cold, dry carbon dioxide.

C-O-Two is an inert, non-conducting, non-damaging gas. It puts out flammable liquid and electric fires. Disappears without a trace—leaves no deposit to clean up.

Write us for more information on modern, clean C-O-Two fire protection.

C-O-TWO FIRE EQUIPMENT COMPANY
NEWARK 1 NEW JERSEY
Sales and Service in the Principal Cities of U. S. and Canada
AFFILIATED WITH PYRENE MANUFACTURING COMPANY

What's DIFFERENT about Globe Protection



"GLOBE SAVEALL" DRY PENDENT SPRINKLER

Permits

a dry pipe system of concealed piping and pendent sprinklers in unheated areas of country clubs, lobbies and dining rooms, porches, resort hotels, show windows, store entrances, institutions, etc.

Prevents

pocket in drop to sprinkler in which water might freeze, also where sediment or pipe scale might collect and harden.

WILL NOT Leak
" " Stick
" " Clog
" " Corrode

GLOBE
Automatic Sprinkler Co.
2038 WASHINGTON AVENUE
Philadelphia 46, Pa.
SALES OFFICES IN PRINCIPAL CITIES

NATIONAL

AER-O-FOAM AND NOZZLES

. . . simple, dependable Fire Protection

Aer-O-Foam is simple to apply . . . clings to vertical surfaces.

AER-O-FOAM flows quickly, forming a tough lasting blanket that smothers flammable liquid or chemical fires . . . insulates threatened areas . . . prevents flashbacks. Aer-O-Foam has proven especially effective in combating airport fires. It is *non-corrosive* and can be easily brushed off buildings and equipment when dry.

National Foam manufactures chemical as well as mechanical foam; also over-head foam spray deflectors and other special fire fighting equipment. Tell us your fire problems — we will recommend specific protective measures.

NATIONAL FOAM SYSTEM, INC.

Specializing in Foam Fire Protection

Packard Building, Philadelphia 2, Pa.

Flame tests demonstrate the fire-resistant qualities of TOLEX.

The Answer: *TOLEX* FIRE-RESISTANT

UPHOLSTERY AND APPOINTMENTS FOR GREATER PUBLIC SAFETY

Wherever fire laws have been put into effect for the greater protection of human beings and their property in places of public gathering—there TOLEX F. R. (fire-resistant plastic leathercloth) fills the bill for upholstery, wall coverings and other interior decoration.

TOLEX F. R.—certified to be fire-resistant by New York City, Boston and other large communities—is the answer for railroad cars, buses, watercraft—hotels, apartment buildings, department stores—restaurants, bars, theaters—any place where people congregate. And TOLEX goes far beyond that! Its colorful lasting beauty and super-toughness have given it top place with wide-awake industries where such qualities count most. A Textileather* product.

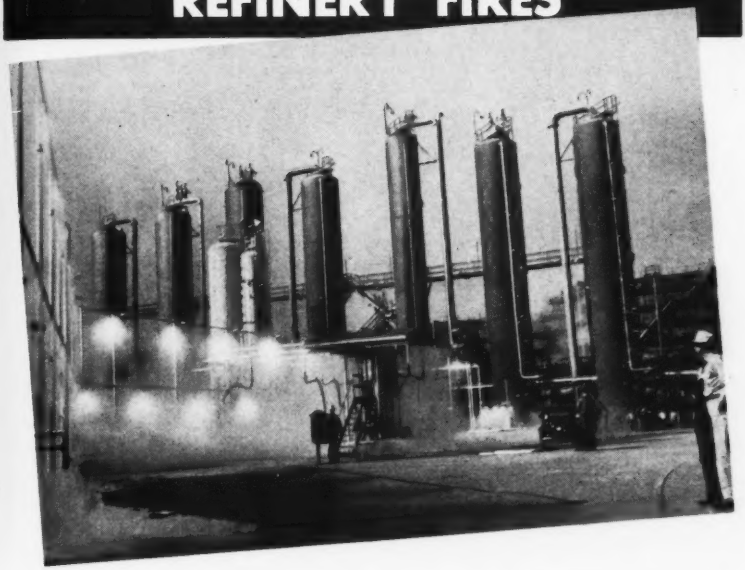
We will gladly send our technical representative to discuss fire-resistant leathercloth specifications and test methods with fire marshalls, fire departments, fire prevention boards or underwriters. Write Textileather Corporation, Toledo, Ohio.

TEXTILEATHER

NOT LEATHER

PIONEERS IN THE DEVELOPMENT OF FIRE-RESISTANT LEATHERCLOTH

ROCKWOOD
WaterFOG Curtain "Stops"
REFINERY FIRES



The photograph above shows a Rockwood permanently piped WaterFOG Curtain in operation—WaterFOG effectively separates this tank truck loading area from the tank car loading area. In this refinery, like many others, the loading areas present a severe hazard and must be constantly guarded against fire. Should a fire break out in and around this section, WaterFOG would automatically be put into action to prevent the spread of fire.

Rockwood engineered permanently piped systems are today protecting many types of equipment, processes and structures, transformers, paint shops, quench tanks, engine test cells, etc.

Rockwood WaterFOG is approved by Underwriters' Laboratories, Inc. and Factory Mutual Laboratories.

Write for bulletin 123, and colored movies (16mm) of Rockwood WaterFOG in action.

ROCKWOOD

ROCKWOOD SPRINKLER COMPANY

56 HARLOW STREET, WORCESTER 5, MASS.

Specialists in Fire Protection Engineering, Equipment and Installation since 1907.

Products of Fiberglas

LISTED AND UNDER RE-EXAMINATION SERVICE BY
UNDERWRITERS' LABORATORIES, INC.

★ ★ ★

"NONCOMBUSTIBLE FABRIC" (Retardant No. 2815)

Owens-Corning Fiberglas Corp., Manufacturer, Toledo, Ohio.

"Fiberglas" Type ECC fabrics woven from natural white color, 100% glass yarns with the fabrics having no after-weaving color coatings. For use as drapery. These fabrics do not burn or propagate flames.

(Also refer to Retardant No. 2814—Thortel Fireproof Fabrics, New York, N. Y. . . . Fabrics woven from 100% Fiberglas yarns and finished with surface color for use as drapery).

"UNIT AIR FILTERS FOR AIR CONDITIONING SYSTEMS" (Retardant No. 2423)

Owens-Corning Fiberglas Corp., Manufacturer, Toledo, Ohio.

Replacement type filter units. Dust-Stop 1A and 2A (Dry Type), Class 1. Dust-Stop 1B and 2B, Class 2.

"ROOF COVERING MATERIALS—BUILT UP" (Retardant No. 2904)

Owens-Corning Fiberglas Corp., Manufacturer, Toledo, Ohio.

Fiberglas Mat for use in the construction of Class "A" built-up roof coverings . . . Three layers of Fiberglas Mat . . . Hot coal tar . . . Gravel surfacing applied on hot coal tar.

★ ★ ★

TESTS ON LABORATORIES' 1947 CALENDAR

. . . "DUST-STOP" AIR FILTERS . . . Continued research.
. . . NON-METALLIC SHEATHED BUILDING CABLE and other electrical products embodying Fiberglas.
. . . FIBERGLAS THERMAL AND ACOUSTICAL INSULATING BOARDS.
. . . FIBERGLAS ROOFING MAT. For asphalt and gravel built-up coverings.
. . . FIBERGLAS INSULATING BOARD . . . And Other Building Products.

OWENS-CORNING
FIBERGLAS

OWENS-CORNING FIBERGLAS CORPORATION
TOLEDO 1, OHIO

STOP FIRE FASTER

WITH AN

THE MASTER OF FLAME
ANSUL
REG. U.S. PAT. OFF.
FIRE EXTINGUISHING EQUIPMENT

DRY CHEMICAL
FIRE EXTINGUISHER

● FASTER fire-stopping power is your first requirement when fire breaks out ... and Ansul Dry Chemical Fire Extinguishers give you that extra margin of protection against major fire damage.

● In addition, you get GREATER fire-stopping power ... because Ansul Plus-Fifty Dry Chemical releases its flame smothering gases in the heart of the flames.

● For fires in flammable liquids and in electrical equipment, Ansul Dry Chemical Fire Extinguishers provide greater protection ... pound for pound and dollar for dollar than any other extinguisher.

Get the facts. Ask for authoritative comparative ratings as determined by a national approval agency.

MADE BY THE MANUFACTURERS OF ANSUL DRY CHEMICAL FIRE EXTINGUISHERS, MODELS 4, 20, 30, 150-A AND 350-A.

ANSUL CHEMICAL COMPANY
FIRE EXTINGUISHER DIVISION, MARINETTE, WISCONSIN

VALVES HYDRANTS

AND PIPE LINE ACCESSORIES

M & H furnishes a complete line of AWWA Valves, iron body, bronze mounted, with double-disc parallel seat or solid wedge type. Non-rising stem, outside screw and yoke, or with sliding stem and lever. Also furnished hydraulically operated. Square Bottom type operates in any position.

Post Indicator Valves, Indicator Posts, Check Valves, B & S Fittings

M & H Tapping Sleeve and Valve (illustrated above) is used to tap a main under pressure for the purpose of taking off a branch leading to automatic sprinklers, fire hydrants, etc. By this method the cut-in is made without interrupting the services on the existing water main.

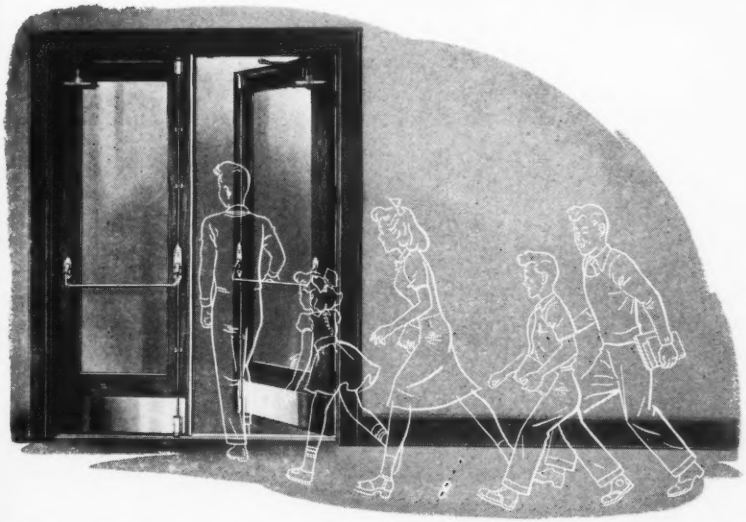
AWWA & UNDERWRITERS APPROVED FIRE HYDRANTS

M & H Fire Hydrants are dry top and revolving head. They are easy to lubricate. Maintenance costs are low due to simplicity of design and rugged construction. They have low friction loss and great efficiency because barrel diameter is not reduced and there are no working parts or obstruction in waterway. Special Traffic model (shown at right) is designed to yield at the ground line under impact. Repair is simple and easy.

M&H VALVE

AND FITTINGS COMPANY

ANNISTON, ALABAMA



THEY TAKE IT!

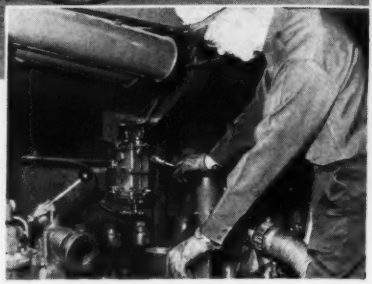
Von Duprin panic devices are built to stand up under the wear and tear of ordinary operation — day after day — year after year — and still have abundant reserve strength to take the terrific punishment imposed on them by a crowd of panic-stricken people. Every part is made to do just that!

Listed by Underwriters' Laboratories, Inc.

VON DUPRIN DIVISION, VONNEGUT HARDWARE CO., INDIANAPOLIS 9, IND.
In Canada, write Yale & Towne Mfg. Co. (Canadian Div.), St. Catharines, Ont.

Von Duprin
TRADE MARK REG.

SELF-RELEASING FIRE AND PANIC EXIT DEVICES



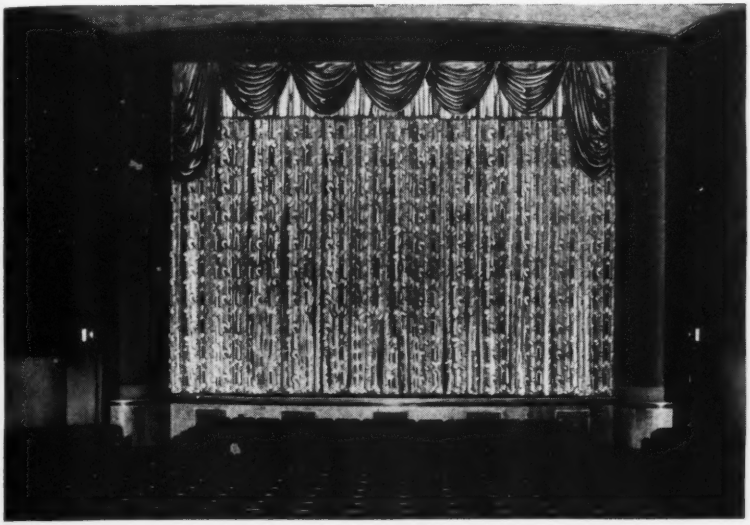
HANDLING GASOLINE *Safely!*

Nearly everyone understands the hazards involved when gasoline is improperly handled. With a clear understanding of the consequences, care in handling is the order of the day. Many of the major marketers of petroleum products equip their tank trucks with S.&J. Internal Hydraulic Safety Valves which immediately stop the flow of gasoline should a fire occur during unloading operations, or accompany a collision on the highway. Union Oil Company of California is one of the marketers of petroleum products who have equipped many of their tank trucks with S.&J. Internal Safety Valves.

SHAND & JURS CO.
BERKELEY, CALIFORNIA

NEW YORK CHICAGO HOUSTON LOS ANGELES SEATTLE

SHAND & JURS



DEVON THEATRE protects patrons with FABRICS THAT *CANNOT BURN*

In the event of fire these handsome Fiberglas* fabrics will not burn, smolder or propagate flame. Unlike "flame-proofed" fabrics woven partly or wholly of organic fibers they will not emit asphyxiating smoke or lethal gases when exposed to flame.

That is why the Devon Theatre in Philadelphia is following the example of the countless other theatres from coast to coast that are taking advantage of the unique fire-safety properties of Fiberglas decorative fabrics. For these fabrics are woven entirely of finely spun *inorganic glass* filaments. They are permanently non-combustible; never require flame-proofing; immune to rot or decay; always operate at 100% efficiency.

If you are redecorating, or planning a new theatre, may we help you?

WRITE FOR SAMPLES AND INFORMATION

STAGE CURTAINS and **WALL COVERING** of Fiberglas fabrics in the Devon Theatre combine the silver and crimson Breeze design with solid colors. Installation by National Drapery Studio of Philadelphia, Pa. FIBERGLAS* Listed by Underwriters' Laboratories, Inc. as "Non-Combustible Fabric;" approved by the Bureau of Standards and Appeals, City of New York.

THORTEL
FIREPROOF FABRICS

ARCHITECTS BUILDING, 101 PARK AVENUE, NEW YORK 17, N. Y. • LExington 2-0711

Sales representatives or recommended workrooms in: **BOSTON, BUFFALO, CHICAGO, CINCINNATI, CLEVELAND, DENVER, DETROIT, LOS ANGELES, NEW ORLEANS, OAKLAND, PHILADELPHIA, PITTSBURGH, RICHMOND, SAN FRANCISCO, ST. LOUIS, ST. PAUL, TOLEDO, WASHINGTON.**

*T.M. Reg. U. S. Pat. Off Owens-Corning Fiberglas Corp.

"FREEDOM IS EVERYBODY'S JOB!"

But . . . . .

Preserving LIFE and the ASSETS of Our Nation from destruction by FIRE is the 'Eternally Vigilant' Responsibility

Of

STAR AUTOMATIC SPRINKLERS

Automatic Sprinklers
Corrosion-Proof Sprinklers
Directional Flow Sprinklers
Open Sprinklers
Spray Sprinklers
Alarm Devices

Automatic Releases
Standard Wet Pipe Systems
Dry Pipe Systems
Deluge Systems
Heat-Actuated Devices
Pre-Action Systems

Star Automatic Sprinklers and Fire Protection Devices bear approval of all Insurance Authorities having jurisdiction and various Governmental Agencies.

Economy in installation cost and maintenance has dictated the consistent policy of Star Sprinkler Corporation in distributing its Fire Protection Devices through local licensed contractors who have had a lifetime of experience in the installation of automatic sprinkler systems. Operating throughout the United States, Canada and South America, Star licensees, due to their strategic locations, can render instant service. Write us for name and address of Star licensed contractor nearest your location.

STAR SPRINKLER CORP.

Westmoreland and Collins Sts. — Philadelphia, Pa.

Fire Chief Canvas . . . could have prevented this fire.

An overturned salamander . . . live sparks falling on a canvas tarpaulin . . . the untreated canvas ignites and disaster follows.

With Fire Chief Finished canvas it would have been different. Fire Chief will not support combustion. The canvas may char a little where the spark contacts it, but will not flame, soon goes out.

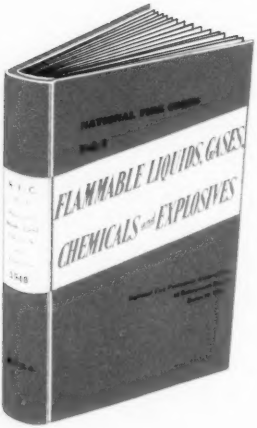
On all construction work, the few extra cents for Fire Chief Finished Canvas is cheap insurance . . . soon repaid by longer use, for Fire Chief is water, weather, mildew and wear-resistant, too.

Wherever flammable canvas presents a hazard, specify Fire Chief. Approved by both the Underwriters Laboratories and the Associated Factory Mutual Fire Insurance Companies.

WM. E. HOOPER & SONS CO.
New York PHILADELPHIA Chicago
Mills: WOODBERRY, BALTIMORE, MD.

"Fire-Chief" Finished
U. S. Patent No. 2,299,612 and other patents
HOOPERWOOD COTTON DUCK

Announcing - - -



The 1948 Edition of

NATIONAL FIRE CODES

for

FLAMMABLE LIQUIDS GASES, CHEMICALS, & EXPLOSIVES

PRICE
$4.00
POSTPAID

Superseding the volume of the same name published in 1945, this 624-page book meets the need of those responsible for safeguarding human life, private and public property from fire and explosion hazards inherent in flammable liquids, gases, chemicals and explosives. It conveniently assembles, under one cover, the many standards dealing with these fire hazards.

The codes are in the form of suggested ordinances, standards, or recommended good practice requirements and are universally used and recognized as the authoritative guides to the best practice.

This edition contains much new material never before published in this volume, including standards for the farm storage of flammable liquids, control of gas hazards on vessels to be repaired, gasoline fueling stations for small craft, and lacquer manufacturing plants. Several other important codes have been completely revised and brought up to date. These include the standards on liquefied petroleum gases, paint spraying and spray booths, and gas systems for welding and cutting. Materials subject to spontaneous heating are listed in a new table. New chemicals used in industry are covered in the revised table of common hazardous chemicals. New solvents and other synthetic liquids presenting fire and explosion hazards are listed, with latest information on flash points, explosive limits, most effective extinguishing agents for the various materials, and other essential information.

Order Your Copy Today!

NATIONAL FIRE PROTECTION ASSOCIATION
INTERNATIONAL
60 Batterymarch St., Boston 10, Mass.

RELIABLE

AUTOMATIC SPRINKLER DEVICES

PROTECTING LIFE AND PROPERTY FOR OVER 25 YEARS

Reliable Automatic Sprinkler Devices have an excellent field record . . . superb in design and construction . . . are universally approved by all Fire Insurance and Governmental Authorities . . . and effect maximum reductions in fire insurance premiums.

They comprise a complete line including Automatic and Open Sprinklers, Alarm Valves, Dry Pipe Valves, Accelerators, Circuit Closers, Water Motors and all other accessories required in Sprinkler Systems.

Reliable Systems are protecting thousands of properties throughout the United States, Canada and foreign countries.

FURTHER INFORMATION UPON REQUEST

Manufactured and Distributed by

The Reliable Automatic Sprinkler Co. Inc.

BRONX STREET — MOUNT VERNON N. Y.

REGO
LP GAS EQUIPMENT

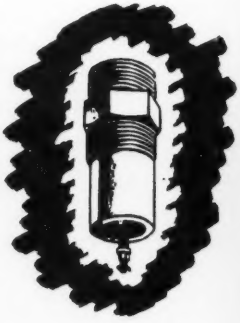
Specified For...

PERFORMANCE PLUS SAFETY!

Here's Why:

- It is listed by Underwriters' Laboratories
- It conforms to N.F.P.A. Standards
- It is manufactured only after thorough field testing
- It is shipped only after being rigidly inspected and tested at the factory

Typical of the many RegO-designed devices for insuring the safe use of LP Gases are RegO Excess Flow Check Valves. These valves, which shut off the flow of fuel should a break in the line occur, may be used with butane or propane in either a gaseous or liquid state. They function with complete efficiency whether mounted vertically or horizontally. A complete range of sizes provides valves suitable for every use, from small domestic installations to large bulk plant or industrial applications.



RegO Excess Flow Check Valves

REGO LP GAS EQUIPMENT

The BASTIAN-BLESSING Company

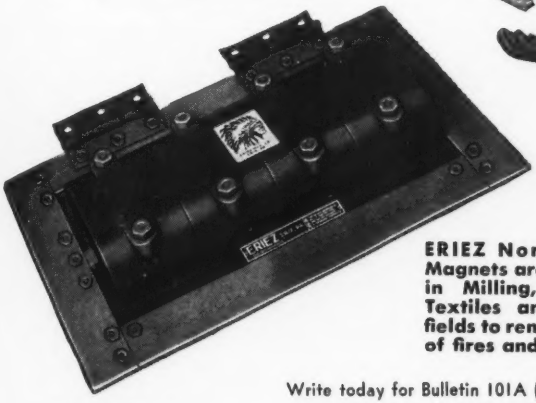
4201 West Peterson Avenue Chicago 30, Illinois

PIONEER AND LEADER IN THE DESIGN AND MANUFACTURE OF PRECISION EQUIPMENT FOR USING AND CONTROLLING LP GASES

TRAMP IRON

A DANGEROUS TRAVELER UNLESS YOUR PROTECTION IS *Eriez* MAGNETS . . .

1. Comply with NFPA Dust Explosion Codes.
2. Entirely *Non-Electric* – cannot Spark.
3. Magnetic Field Guaranteed to Last.
4. Lowest Initial Cost.
5. No Operating Cost. No Repair Cost.
6. Lightest and Most Compact.
7. Easiest to Install.
8. Made Any Size to Fit Your Requirements.
9. MOST PROTECTION PER DOLLAR.



Hinged types approved by Mill Mutual Fire Prevention Bureau for Class A or Class B installation.

ERIEZ Non-Electric Permanent Magnets are preferred equipment in Milling, Chemicals, Plastics, Textiles and General Industrial fields to remove tramp iron, cause of fires and explosions.

PATENT PENDING

Write today for Bulletin 101A (Milling), 102B (Industrial), 104A (Textiles), 501A (Pulley), 600 (Drum).

When It's Magnetic Protection . . . See Eriez First

ERIEZ MANUFACTURING COMPANY

39 East 12th Street • Erie, Pennsylvania

One of the most important fire protection developments introduced in recent years is the use of water in fine spray form for the control and extinguishment of fire. "Automatic" FIRE-FOG is an outgrowth of this development and is, by virtue of its performance, a leader in the field.

Among the many exacting installations of "Automatic" FIRE-FOG is one standing guard over butadiene unloading operations at the Goodyear operated Rubber Reserve Plant at Akron, Ohio. Naturally, the complexity of operational facilities at this plant demand carefully studied fire hazard safeguards for every process . . . safeguards that will withstand rigorous test under the most difficult conditions 24 hours every day in the year.

The significant thing about an "Automatic" FIRE-FOG installation is its readiness for instant — automatic action now — next week — next year — in fact, whenever the danger of fire threatens.

You owe it to yourself, your personnel and your business to become fully informed on the merits of "Automatic" FIRE-FOG. Investigate today at no obligation. Write or call "Automatic" Sprinkler Corporation of America, Youngstown 1, Ohio.

"Automatic" Sprinkler devices and systems are listed by Underwriters' Laboratories, Inc., and approved by Factory Mutual Laboratories.

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DEVELOPMENT ENGINEERING
"Automatic" Sprinkler
MANUFACTURE INSTALLATION
"AUTOMATIC" SPRINKLER CORPORATION OF AMERICA
YOUNGSTOWN 1, OHIO
OFFICES IN PRINCIPAL CITIES OF NORTH and SOUTH AMERICA

Eliminate

Delayed Alarms

Reduce

Fire Losses

WHEN FIRE OCCURS

Call the Fire Department. Delay creates unnecessary fire waste and life hazard

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Protection Against Fire